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POSTGRADUATE MEDICINE

PREVENTION AND TREATMENT OF DISEASE

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POSTGRADUATE MEDICINE

PREVENTION AND TREATMENT OF DISEASE

BY

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FOREWORD

The bedside management of so-called internal derangements is an art, the portrayal and execution of which is never quite uniform because of the difference in the viewpoint and methods of physicians.

The presentation here offered to the practitioner and advanced student is based on an experience of forty years in public and private practice, and of thirty years in graduate or postgraduate teaching, and embraces all modern methods of disease management of proven therapeutic value.

The great body of medical practitioners have given themselves up to the study of the abnormal; their services are sought for in connection with already existing ailments.

Medicine, however, is quite as much concerned with the prevention of disease, or the preservation of health, as with the cure of ailments. The true physician will recognize that preventive and corrective measures must go hand in hand, and that a book on therapeusis should also be a guide to prophylaxis.

In endeavoring to present postgraduate teaching in book form, the author has departed somewhat from the usual academic arrangement of contents (as found in works on practice), with the hope of enhancing the practical value of the book.

The customary division into digestive, cardiovascular and blood diseases, disorders of the lymphatic, respiratory, genito-urinary and nervous systems, infective fevers, faulty metabolism, faulty internal secretions, and locomotor disturbances, has been adhered to. In addition, a section on *nonbacterial parasitic diseases* has been added, also one on *minor ailments,* one on *emergencies, drug addictions, poisons and antidotes.* In a special section are grouped Tuberculosis, Syphilis, and Carcinosis, as invaders of all regions and tissues of the human body, for the purpose of emphasizing their clinical importance as regards prevention, early recognition and treatment.

Finally a section on *Bedside and Office Technic* has been added. The book has a number of well-tried prescriptions, is profusely illustrated and has a carefully prepared index.

For the very kind reception of the author's work on "Differential Diagnosis and Treatment of Disease" he is deeply grateful and hopes that his colleagues will be favorably impressed by the present offering.

The author takes this occasion to record his appreciation and thanks for effective coöperation in this work to Doctors Ernest Jutte, Howard

Crosby Hoff, Mark Brown, F. C. Steinmetz, A. H. Schmidt, Dan. R. Ayers, Charles H. Sanford, Marshall C. Pease, and to the publishing house of D. Appleton and Company.

AUGUSTUS CAILLÉ.

New York.

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Section I

Bedside and Office Technic

In this section the writer has arranged, in a manner easily accessible for reference, the general therapeutic and certain diagnostic procedures employed at the bedside and in the office. They are the every-day practical methods which the physician may at any time be called upon to employ.

Special therapeutic measures not enumerated in this section will be found in the discussion of the management of special ailments.

Feeding Methods—Vitamines—Diet Systems—Food Values

Feeding Methods

Nursing

Nursing the Infant.—The newborn child which has been properly cleansed and clothed may be put to the breast after the mother has had a refreshing sleep. In the meantime, or in case the milk is somewhat delayed, the infant should receive, at intervals of three hours, about 2 ounces of warm sweetened fennel tea by bottle and nipple. Should the milk be delayed beyond the second day, artificial feeding must be *temporarily* resorted to. For this purpose we may make use of one of the proprietary foods, preferably one that does not require the addition of cow's milk. We give 2 ounces every three hours and one feeding in the night. When milk appears in the breast, but is scanty and the infant shows by its actions that it is still hungry after its nursing, 2 ounces of bottle-food may be given after every second nursing. This will usually satisfy the child and it will go to sleep thereafter. Overfeeding and irregular feeding will result in unrest, dyspepsia and malnutrition.

If the breast milk removed by pump looks watery and shows a poor fat content by analysis, the infant may continue at the breast and have

supplementary feedings several times a day. Mother's milk may change for the better in a few days.

A New Galactagogue.—To stimulate the mammary glands it has been suggested to inject 1 c.c. of the mother's own milk into her subcutaneous tissues under the strictest aseptic precautions and repeat this injection on the second and fifth day following.

Symptoms Indicating Insufficient Nourishment.—When a child is born it should be weighed and no concern need be felt if in the first week a loss of weight be noticed, for that is normal. After the first week and under normal conditions, a steady gain is usually recorded.

Infants not getting enough nourishment show weakness, have a feeble cry, and a rise of temperature and lose weight. Frequent crying does not in itself indicate hunger or insufficient nourishment.

How to Prepare Supplementary Feedings.—To facilitate the preparation of supplementary food it may be well to have a gas stove or alcohol stove at hand, in or near the nursery. Two small aluminum pots, one for boiling the nursing bottle and nipple, are necessary. The utmost cleanliness must be exercised in handling the bottle and nipple and food. After the baby has taken the bottle, the latter and the nipple are cleansed with hot water and brush. The bottle is immersed with its nipple in a pot of water which is brought to a boil before the bottle is used again.

As regards supplementary feedings we have our choice between modified cow's milk, diluted condensed milk or some proprietary food.

According to the experience of the writer there will be less danger from dyspeptic diarrhea in the first weeks of life and in warm weather if we select one of the proprietary foods which does not require the addition of fresh cow's milk. If modified cow's milk is selected for temporary feedings it must be certified to as clean and sweet and free from preservatives, by a reliable firm or dairy, and it must receive proper attention by the nurse or servants in the household. In warm weather pasteurization of milk is essential. The "Home Pasteurizers" made in Rochester and New York are well adapted for this purpose.

Prevention of Mastitis and Abscess during the Nursing Period.—To prevent infection and inflammation of the nursing breast certain precautions must be taken. A covered tray, holding the following articles, is provided for mother or nurse:

One tube of white vaselin
White castile soap in dish
Sterile absorbent gauze in jar
Sterile absorbent cotton in jar
Pure alcohol
Sterile water
Four per cent boric acid water
One hand brush.

When the child is to be fed the mother or nurse uses soap-water and brush to cleanse her hands. She uses soap-water, alcohol and cotton to cleanse the breast and nipple. She uses boric acid solution and sterile gauze to cleanse the baby's mouth and puts it to the breast in such a way as to keep the nose free.

After nursing, the breast is again cleansed and the nipple region is anointed with vaselin and covered with sterile gauze. This cleansing routine is observed at every feeding and soon becomes a habit, and the result justifies the expenditure of time and effort.

Management of the Nursing Infant.—The infant must be fed, kept clean and kept quiet. A cleansing bath once a day, or twice a day in warm weather, is necessary. The nates should be oiled and powdered—diapers must be thoroughly washed and dried before they are used. The nose of the child must be kept free of mucus and dust, by means of moist cotton on the end of a toothpick, and vaselin may also be applied to the nostrils. Feeding should take place regularly every three hours—7 a. m., 10 a. m., 1 p. m., 4 p. m., 7 p. m., 10 p. m., plus one feeding at night. Some infants do well on a four-hour feeding.

If an infant oversleeps its feeding time it should not be disturbed. Feeble children may be nursed every two hours.

The child should sleep in a stationary crib—not in a cradle—and it must not be taken up or carried about or fed out of time when it cries. After the baby is two weeks old it may be taken out of doors, for hours, on fair weather days, also in cold weather.

Constipation is overcome by means of a soap-suds enema or soap suppository. Wind colic will normally adjust itself after an effective enema, or relief may be obtained by the administration of warm fennel tea to be given by spoon. In case a feeble infant shows symptoms of indigestion while feeding at a healthy breast, it is well to omit a feeding occasionally and give some warm fennel tea instead. In warm weather a few spoonfuls of boiled and cooled water may be given several times a day.

Children should be handled gently and deliberately. Impulsiveness and fussiness in handling an infant will upset any child. Kissing a child upon the mouth must not be permitted.

These rules for managing an infant are fundamental and vital. The confusion and discomfort in the household occasioned by the advent of the baby are mostly due to mismanagement.

Bottle Feeding

Comparative Table

	FAT	SUGAR	PROTEIDS
Human Milk	4	7	1½
Cow's Milk	4	5	4

General Principles of Milk Modification

1. Reduce the proportion of proteids by dilution (thin oatmeal or barley gruel or water).
2. Increase the quantity of fat originally sufficient but made insufficient by the necessary dilution.
3. Increase the sugar and salt made insufficient by the necessary dilution.
4. Sterilize or pasteurize in warm weather or for special cases.

Schedule of Home Modification of Cow's Milk (Author's Method)

	A (1-4)	B (1-3)	C (1-2)	D (1-1)	E (1-5)
Cane Sugar	2 oz.	1½ oz.	1¼ oz.	1 oz.	2 oz.
Table Salt	20 gr.	18 gr.	15 gr.	10 gr.	10 gr.
Diluent	26 oz.	24 oz.	20 oz.	15 oz.	26 oz.
Top Milk	6 "	8 "	10 "	15 "	5 "

By top milk we mean the *top pint* of a quart bottle of milk which has stood 4 hours. It contains double the amount of fat of normal whole milk.

FIG. 1.—AUTHOR'S METHOD OF DILUTING THE TOP PINT OF A QUART BOTTLE OF MILK WHICH HAS BEEN STANDING FOUR HOURS.

A.—For young infants (1 month) and difficult feeding cases. Feed 2 ounces every 2 hours (twice at night).

B.—Adapted for young infants with good digestion or for infants 2 to 3 months old. Feed 2 to 3 ounces every 2 hours (twice at night).

C.—Adapted for infants from 4 to 8 months. Feed 4 to 6 ounces every 2½ to 3 hours, 8 feedings in 24 hours (once at night). After the eighth month, give 6 bottles and 2 feedings of cornstarch pap with egg, or mutton or beef broth with rice or sago.

D.—Rich milk adapted for children over 1 year old. Give 5 bottles, 6 to 8 ounces each, and 2 additional feedings as above (meat broth—egg).

E.—For premature infants feed with medicine dropper about 1 ounce every 2 to 3 hours.

General Rules for Feeding Cow's Milk

Fill the mixture into small nursing bottles, each to contain one feeding, and cork with a pledget of clean cotton. Keep raw and pasteurized milk food on ice. Before feeding, heat to body temperature by placing the bottle in hot water. Then remove cotton and feed by means of a rubber nipple.

To sum up, I would say there are no universal rules for feeding cow's milk. What we must aim at, is to individualize in each and every case, and not attempt to adapt one form of feeding to all cases and under all conditions.

In a difficult feeding case, cow's milk should be discontinued for a short time and cereal decoction and egg white, etc., substituted.

In resuming cow's milk we begin with a low strength and gradually work up to full strength milk and avoid overfeeding.

Digestion of cow's milk is best stimulated by carrying children out of doors, not by drugging with artificial digestants.

Idiosyncrasy for cow's milk is managed by selecting some substitute food, if possible the breast of a wetnurse, if the child is not over four months old.

Cow's milk should be sterilized in warm weather. Infants will usually thrive on properly modified cow's milk up to seven months. After the seventh or eighth month they are apt to become rachitic unless they receive beef or mutton broth with cereals and egg, in addition to cow's milk.

With proper hygienic management to stimulate the motor function of the gastro-enteric tract, we may let the secretions take care of themselves.

Curds in the stool indicate indigestion. A *casein curd* is large and tough with unchanged fat in its meshes. It sinks in cold water and hardens in 10 per cent formalin solution after six hours.

Fat curds are small and soft. They are associated with yellow or green mucus—are composed of soap and fatty acids. They remain suspended in cold water and do not harden in formalin.

In *casein* or *fat indigestion* dilute the milk before changing to another food.

For *sugar indigestion* we have no special test. A high percentage of sugar is frequently a disturbing factor.

Infant feeding is a simple problem which is clouded by ultra-scientific methods. There is no one ideal method of feeding, and it is useless to look for it. Cow's milk cannot be modified to exactly take the place of mother's milk, and *simple modifications* give as good results as complex modifications in hospital and private practice. Infant feeding will always be more or less *empirical* and never exactly scientific because of the *variations of digestive power* of different individual infants and the *complexity of the organic constituents* of food undergoing disintegration by organic secretions and bacteria.

Studies in metabolism are very interesting, but calculating the tolerance of the individual for sugar, starch, fat and proteids is too complicated for daily use and generalization is impossible. The recognition of the importance of feeding clean milk and of sterilizing or pasteurizing milk

of doubtful cleanliness is the chief scientific advance in infant feeding

Eiweissmilch.—"One quart of whole milk is heated to 190° F for three minutes and then cooled to body temperature. Add essence o pepsin enough to coagulate all of the casein. Break up the curd with fork or spoon and allow to settle. Heating the milk to a temperature o 190° F. changes the character of the calcium salts so that the curd forme by the addition of rennet will be soft, flocculent and non-adherent. Th essence of pepsin is used instead of stronger rennets, so that the curd wil remain soft. The precipitated casein is allowed to settle and the liqui part is decanted. Straining the curd through linen or a wire straine is impossible, because the curd is of such consistency that the meshes o the strainer are quickly obliterated so that no drainage takes place. Afte all of the liquid has been removed and only the curd remains, this precipi tate may then be put into a wire strainer and the remaining portion o the whey allowed to drain off. This dry curd is then pushed throug a fine wire strainer by means of a spoon, into one pint of buttermilk an one pint of water. After the curd is strained into an empty dish, th particles quickly adhere and you have gained practically nothing b straining. This precipitate must be strained into liquid in order to mak use of the colloidal action so that these particles will remain separated The buttermilk, water and curd is then strained again, put into glass jar or bottles and kept on the ice." (Used for difficult feeding cases.)

Buttermilk.—A pure culture of lactic acid bacilli is added to skimme milk in an earthenware dish, and allowed to stand at about 70° F. fo twenty-four hours, or until the casein is coagulated. Stir vigorously i a churn, or with a spoon or egg beater until the curd is very small, an then push the contents through a fine wire strainer with a spoon. If th buttermilk is too thick add a small amount of water. When the buttermil is once made, about four ounces may be used as the inoculating agent fo the next supply to be made. In this way the original culture may b made to last from six to eight weeks. The quality and action of th product made will vary but little. Add the four ounces of buttermilk t the fresh milk, incubate and follow the above outline. Sometimes the mil will not coagulate, although it may smell sour. Stirring gently with spoon will often produce coagulation in a few minutes. The fat presen will rise to the top and when coagulated appears as a brownish yello scum, which may be removed before the curd is broken up.

Pure cultures may be obtained at any biological laboratory and are b all means the safest and surest, especially when a child is concerned.

Whey.—Heat fat free milk (skimmed) to about 100° F. Add enoug rennet or essence of pepsin to form a junketlike mass. Stir well to brea the mass as finely as possible and allow to stand for ten minutes. Pou off the top and strain through several thicknesses of gauze.

If the whey is to be added to milk or cream, it must be heated to 157° F. and immediately cooled to prevent the further action of the rennet.

Malt Soup in Nutritional Disturbances of Infants.—

Mixture No. 1.—Flour..... 1.5 oz.
Maltzymose. 1. "
Water.....20. "
Milk.....10. "
} FOR YOUNG INFANTS

Mixture No. 2.—Flour..... 1.5 "
Maltzymose. 1.5 "
Water.....15. "
Milk.....15. "
} FOR OLDER INFANTS

Directions.—Mix the flour with half the water and boil. Cool to blood temperature. Add maltzymose dissolved in the rest of the water and let stand a few minutes. Then add the milk and bring to a slow boil.

According to Keller and Czerny, there is a definite indication for the employment of this food, i. e. in the milk nutritional disorder described by them. It begins insidiously with irregular gain or loss in weight, and increase of food does not mend matters. The baby becomes pale and the skin loses its elasticity. The muscles are flabby. Restlessness, peevishness, and inability to sleep are common. Abdominal distention is often present, and sometimes vomiting. The stools are gray or whitish and very dry, frequently foul smelling. Their reaction is markedly alkaline. They may become loose and acid in case of complicating dyspepsia or intestinal infection. Lacking proper treatment, many of these cases develop marasmus.

The disease is a severe metabolic disturbance and non-bacterial. It is caused by a high percentage of fat in the food, and owing to the recent popularity of top mixtures it has become frequent. The therapeutic test, diminution of the fat percentage, reveals the condition.

The author has used malt soup in this condition with advantage; even if marasmus has appeared the treatment is sometimes successful. It is not adapted to infants under three months of age, in whom albumin milk is more apt to be of service. In diarrheas, it is frequently of inestimable value.

Maltine Malt Soup Extract.—Maltine malt soup extract is used in preparing malt soup as follows:

Mixture No. 1.—Take 5 tablespoonfuls of Malt Soup Extract and dissolve in 1½ pints of warm water.

Mixture No. 2.—Take 5½ tablespoonfuls of wheat flour, mix with ¾ pint of milk and strain through a clean sieve.

Directions.—Add Mixture No. 2 to Mixture No. 1 and boil for three

minutes, stirring constantly. Cool quickly and pour into clean (preferably sterilized) bottles holding 6 ounces each. Plug them tightly with absorbent cotton, or if corks are used they should be absolutely clean and close-fitting.

Keep in a cool place.

One liter represents about 700 calories.

Keller's Malt Soup Extract.—This is an imported preparation used in the same manner as the preceding.

Dry Malt Soup Stock prepared by Mead, Johnson & Co. is now in the market.

Balanced Vegetable Purée for Bottle Fed Children after the Age of Six Months (Stark).—To one liter or quart of water that has just been boiled and removed from stove add one rounded tablespoonful of German lentils, 3 rounded tablespoonfuls of fresh peas or 2 tablespoonfuls of dried green peas, 3 tablespoonfuls of fresh lima beans or 2 tablespoonfuls of dried lima beans (always prefer the fresh to the dried and the dried to the canned), 2 carrots five inches long, thoroughly washed very lightly scraped, not peeled, and then chopped fine, 2 potatoes the size of medium hen's eggs, thoroughly washed and not peeled but cut into small cubes with the peelings on (never use new potatoes); prepare this the night before and allow to stand in covered pot over night. The next morning bring the contents of the pot to a boil and allow to boil actively stirring occasionally, for fifteen minutes, never longer, then drive the entire contents through a medium sieve so that nothing remains in the sieve but vegetable husks and peeling fragments. Mix one rounded tablespoonful of melted butter with one rounded or two stroked-level tablespoonfuls of ordinary white flour until smooth and then stir into the purée which is again allowed to boil for five minutes more, stirring constantly. Boiling water is then added until the total measures one liter (quart) and at first and then a medium thimbleful of table salt is added and stirred into the purée.

This purée may be kept on ice for twenty-four hours if not all is used the first day it is completed. It is not recommended to be used for infants after the second day it has been made.

This purée contains 800 calories to the liter or 25 calories to the ounce.

By animal experiment it is found to contain sufficient of the proper inorganic salts and active vitamines as well as all the important amino acids to maintain a metabolic balance and promote growth.

It is well digested by a six months' infant if diluted one half with boiling water, by a seven months' infant if diluted with one third water and an eight months' infant will digest it full strength.

Sterilization and Pasteurization

Sterilization and pasteurization of food for immediate consumption are usually not necessary. *Milk* is the exception. In warm weather bacteria rapidly multiply in milk, and because of the ease with which they may be made innocuous, milk is nowadays, as a matter of routine, either sterilized, that is, heated to 212° F., or pasteurized, i. e., heated to 167° F.

Apparatuses for either method are now on the market.

The milk is put into bottles, each holding sufficient for one feeding, and stoppered with a pledget of cotton. The bottles are placed in a kettle of water or sterilizer and rapidly brought to the desired temperature, at which they are kept for twenty minutes. They are then rapidly cooled and put on ice or in a cool place.

FIG. 2.—HOUSEHOLD MILK PASTEURIZER.

Peptonized Milk

Peptonized milk is occasionally indicated for a short time, when the stomach is unable to retain food.

Peptonizing powders with directions for use are obtainable in most drug stores.

The powder—usually 5 grs. pancreatin and 15 grs. of bicarbonate of soda—is mixed with a cup of cool water, added to a pint of fresh milk, shaken well and put on ice, or the vessel may be put in water at 115° F. for ten minutes and then placed on ice.

Vitamines and Vitamine Therapy

Careful study of the composition of various foodstuffs reveals that most of our natural foods contain a class of substances the existence of which had been unknown to us until recent years. It is found that these substances are essential to normal nutrition and growth and if lacking or deficient in diet cause such diseases as beriberi, scurvy, rachitis, pellagra and polyneuritis.

The substances as a class have been named vitamines, of which three distinct varieties have so far been discovered. These are the "Fat-soluble

A" (fat-soluble vitamine), "Water-soluble B" (antineuritic vitamine) and the "Water-soluble C" (antiscorbutic vitamine).

Many preparations are at present being put on the market which are supposed to contain these vitamines in concentrated form and which are recommended in a variety of conditions.

Preparation of Autolyzed Yeast.—Dry pressed brewer's yeast is placed in an incubator at 37.5° C. for 32 hours and the fluid is allowed to gravitate through a paper filter. This liquid is kept at the ordinary room temperature for 10 hours more (which allows the purin bodies to separate) and is again filtered.

Fluid autolyzed yeast should be kept on ice and will keep indefinitely. If deposits form they are decanted—if mould forms the preparation is spoilt.

Dosage.—Five to 30 drops in a teaspoonful of milk 3 times a day after feeding.

Autolyzed yeast is used as a prophylactic against deficiency diseases in difficult feeding cases and as a curative agent in all forms of deficiency disease such as *beriberi, rachitis, scurvy, pellagra,* etc., in connection with other treatment. Pancreatic vitamines are suggested in marasmus.

Special Feeding Methods

Gavage.—By gavage is meant the introduction into the stomach of food through a soft stomach tube, or in children through a catheter, size No. 12 to 14. It is employed when rectal feeding is inadvisable, after tracheotomy and intubation and other operations about the mouth and throat, in coma and when nourishment is refused, in habitual vomiting and in premature children who will not swallow. If the patient struggles or bites the tube it may be passed through the nose.

Children are placed flat on the back, with arms and legs confined by a sheet tightly wrapped around the body. The lubricated tube is then gently passed into the stomach and the food is allowed to run down through the funnel; then the tube is pinched to avoid dripping and is rapidly withdrawn. The patient is kept in the recumbent position for some time. The operation may be preceded by lavage in case of gastric catarrh.

The tube should be thoroughly boiled before and after use.

Feeding Cup—Glass Tube—Dropper.—Patients who cannot sit up in bed or those who must take their food in the recumbent position may be fed by means of a feeding cup, which is constructed so as to prevent spilling. Or the patient may suck up fluids through a properly bent glass tube having a lumen of about one-quarter of an inch. Delirious or unconscious patients can be fed with a dropper, the liquid food being allowed to trickle down drop by drop.

Rectal Feeding.—Rectal feeding is at best only a temporary make-

shift and a poor substitute for the ordinary form of feeding. The patient will not thrive on it. It is indicated in stenosis of the upper digestive tract, in feeble digestion and gastric ulcer when duodenal feeding is unavailable, in incessant vomiting and in the insane.

A cleansing enema should first be given. The lubricated tube is then inserted as far up into the rectum as it will go, with the patient on his back and his knees drawn up. The food is allowed to flow in from a fountain syringe or irrigator and the tube then withdrawn, the buttocks being compressed to prevent leakage.

Many recipes have been recommended and abandoned.

Milk and thin gruels or peptonized food or prepared flour in water with a good pinch of salt and with or without wine or whisky and artificial fat emulsion are probably the best. Six to eight ounces may be given three times a day.

The Author's Method of Rectal Feeding (*Child or Adult*).—First empty the bowel by means of a soap-suds enema (1 to 4 pints); if there is no response after one-half an hour, follow with a second enema (1 to 2 pints); then insert a rectal tube to carry away water, flatus, etc. Leave tube *in situ,* and 15 minutes later administer:

1 or 2 eggs
¼ to 2 ounces sherry wine or whisky
2 ounces water
10 to 15 grains of table salt.

Fig. 3.—Duodenal Feeding. (After Aaron, "Diseases of the Stomach," published by Lea and Febiger.)

Warm to 100° F. Feed by funnel and tube slowly.

Second Feeding.—Saline irrigation—1 dram to 2 quarts.

One-half Hour Later.—

Beef broth
White of 2 eggs
2 ounces sherry
Pinch of salt
Pinch of bicarbonate of soda
1 dram pancreatic emulsion (Savoy & Moore)

Instead of the above use Fairchild's Enemose with water and whisky.

Duodenal Feeding.—Duodenal feeding, introduced by Dr. Einhorn of New York, is a comparatively new and possibly a useful measure in ulcer of the stomach, incessant vomiting, and whenever it is desired to give the stomach a rest.

Of the duodenal tubes in use Einhorn's, Jutte's or Gross's tubes giv the least inconvenience to the patient. Jutte's tube is readily introduced and on account of its small olive end, slips into the bowel within two t five minutes, so that it need not be retained between feedings. Direction for its use are given under Duodenal Lavage.

The food must naturally be fluid and thin. One to two pints of ver thin gruels, broths, bouillon, diluted or peptonized milk, malt liquors di

FIG. 4.—FEEDING IN HORIZONTAL POSTURE (INTUBATION CASES). (After Morrow, "Diagnostic and Therapeutic Technic," published by W. B. Saunders Co., Philadelphia.)

luted or beef juice may be given two to four times a day, as indicated.

The location of the tube is found by means of the fluoroscope or by observing that the aspirated fluid from the duodenum is alkaline. Liquid food of any kind is administered by funnel or syringe. Duodenal feeding is of small practical value in infants and children; it may possibly be useful in spasmodic vomiting, etc. In children a small soft catheter is all the apparatus necessary.

Feeding in Intubation Cases.—Before resorting to gavage one should try feeding with the patient in the horizontal position. Semisolid food is usually swallowed without difficulty in the upright position.

Bismuth Feeding.—This is used in connection with x-ray investigations

for diagnosis of lesions of the digestive tract. Two ounces of bismuth subcarbonate or subnitrate or of barium sulphate are mixed with a viscid vehicle, such as apple sauce, kumyss, zoolak, kefir, cereal gruel or gum acacia. Progress of the meal through the intestinal tract is determined by frequent subsequent fluoroscopic and roentgenographic examination. To determine lesions in the lower bowel, the bismuth mixture is given per rectum.

Feeding with Elevated Hips.—This is resorted to sometimes in debilitated patients and in cases of persistent vomiting.

Diet Systems

Diet After the Age of One Year

Specimen Diet After Weaning or During the Second Year of Bottle Feeding

Milk.—Full or half-strength sterilized or pasteurized in summer.

Cereals, Etc.—Oatmeal, farina, hominy, etc.—well cooked; cracked oats, cream of wheat, Pettijohn, rice, force—with salt, sugar or cinnamon; with and without fresh cream or top milk; racahout.[1]

Toast, Etc.—Milk toast, zwieback, crackers, sweet crackers, bread and butter.

Meat Broths.—Soup with cereals, soup with egg, soup with toast, beef juice.

Eggs.—Scrambled, custard.

Water.—Boiled and cooked. After 18 months give minced meat.

For children from two to three years old, add mutton chops, rare beef, soft-boiled eggs, baked apples, stewed prunes, orange juice.

Specimen Diet After the Third Year

Soups.—Plain soups and broths of nearly any kind.

Eggs.—In any form—soft-boiled, omelette, scrambled, poached, eggs beaten in milk.

Meats.—Beef, beefsteak, lamb, mutton, lamb chops, chicken and turkey, broiled, roasted or boiled.

Fish.—Any kind—boiled or broiled.

Vegetables.—Peas, beans, spinach, lettuce, potatoes, tomatoes, asparagus tips, stewed celery.

[1] Racahout.—

Rice flour	1	part
Potato flour	1	"
Dutch cocoa	1	"
Granulated sugar	1½	"

Heaping tablespoonful of racahout to one-half pint of milk. Mix with enough milk to make a paste, add rest of milk and let boil for five minutes.

Cereals, Etc.—Oatmeal, rice, hominy, wheat, barley, corn meal, wheat and graham bread, toast, zwieback, oatmeal, graham, soda and water crackers, macaroni, etc.

Fruits.—Nearly all stewed or sweetened, peaches, pears, plums, oranges.

Dessert.—Light puddings, custards, jellies (most of the jams in the shops are artificial or adulterated), ice cream, honey, chocolate.

General Rules for Feeding

Young children should be fed five times a day; they usually take from one to one and one-half quarts of fluid food; some children will be hungry at all times and others have a capricious appetite.

The nibbling of food between meals destroys the appetite. No food will agree unless the children exercise. The craving of children for sweets should not be entirely ignored. School children should have a short vacation at reasonable intervals or as soon as they show marked fatigue. Children's digestion suffers but little from romping after a meal.

Fever Diet

The notion to underfeed fever patients with a bland diet has given way to the practice of feeding more liberally, as gauged by the caloric value of food and the caloric requirements of the individual in normal health.

Because of anorexia, and of the frequency of digestive disturbances, alimentation often presents considerable difficulty. The great nitrogen loss in fever apparently demands an appropriate intake of proteids or proteid sparers, i. e., carbohydrates. Fats are usually not well borne in fever.

Mainly because of aversion to solid food, a fluid or semifluid diet is indicated for fever patients. It has the additional advantage of quenching the thirst, the fluids being regulated so as to produce from one to two quarts of urine a day.

The patient should be fed whenever possible by the *thermometer* when the fever is low, and not by the clock at regular intervals of a few hours, irrespective of the temperature. In this way the food is less of a tax on the system and is more easily retained and digested.

Fluid Diet

Milk, warmed or iced, is favored by most physicians because of its nutritive and high caloric value. An objection is often found in its tendency to induce fermentation, which may be lessened by the addition of cereal decoction or plain mineral waters. Small amounts of whisky or brandy may be added if indicated.

Thin soups, beef tea, gruels, porridges, jellies to which egg or various fruit juices and butter (whenever possible) may be added, as well as white of egg in water, kumyss, matzoon, ice cream, water ices and custards are usually well borne. Meat extracts and beef juices, if freshly prepared, are appetizing and wholesome. Small quantities of alcohol are not contra-indicated, and are preferred in the form of brandy, champagne or light wine, diluted or beaten up with an egg. Iced lemonade and mineral waters are well liked.

Soft Diet

With the fever abating and the appetite increasing, the patient may have in addition to the above: scraped beef; eggs, raw, soft-boiled or scrambled; oysters, raw or stewed. The patient, while in this condition, may also have thin hard toast, dry or butter spread, crackers, zwieback, cereals, spinach, lettuce, green salads, asparagus tips, water cress, potatoes—mashed or baked—omelets, calf brain, sweetbread, caviare, baked apples, apple sauce, stewed prunes, oranges, grape fruit, light cakes, biscuits. Rice, tapioca or farina (well boiled or as puddings), preserves, blancmange, charlotte russe, etc., are also included.

To avoid overloading the stomach it is often advisable to give small quantities at intervals of two to four hours.

Full Diet

Unless contra-indicated for special reasons, meats, game, fish or fowl (not mentioned above) may be taken either broiled, roasted, stewed or boiled, being careful until complete recovery is reached to avoid heavy sauces and too fatty substances. Of vegetables, asparagus, tomatoes, celery, cauliflower, beets and others may be given; also cheese. Desserts, if too rich, are apt to cause excessive fermentation in the bowel.

Milk Diet

The scientific value of an exclusive milk diet is still a question. Moreover it is hardly possible for most adults, for any length of time, to take the equivalent of even two thousand calories—namely, three and one-half to four quarts of milk a day—with comfort. Still, the strict milk diet has its indications, and the so-called Karell diet is occasionally administered with very good results.

The Karell Diet for Obesity and Dropsy

This is a low calory diet and is adapted to obesity cases, to disturbances of the heart and circulation, kidney and certain cases of indigestion and metabolic disturbances.

The Karell diet consists in giving 800 c.c. (27 oz.) of milk, in four feedings at intervals of four hours—other food and drinks being absolutely

excluded. This quantity of milk is equivalent to about 575 calories, while the average requirement of an adult at rest is about 2,000 calories.

The patient is usually put to bed for a week, and sometimes for two or three weeks.

The embarrassed heart will soon work more easily and, with the simultaneous disappearance of edema, the condition of the patient usually improves. In certain cases it has been found advisable to combine stimulation with digitalis with this treatment. As conditions improve a more liberal diet is prescribed.

Diet for Leanness

("Mast-Kur")

This diet aims to rapidly increase the body weight and is indicated in visceroptosis, in neurasthenic patients where it is combined with rest, and generally in individuals reduced in weight and health. The diet should be easily digestible and not too voluminous.

To obtain a moderate increase in weight it is often sufficient to add 2 to 2½ ounces of butter to vegetables, bread and potatoes in the ordinary diet, or to let the patient drink a quart of milk and cream a few hours before the regular meals.

To obtain a greater increase a first breakfast of soup made with prepared flour and butter is recommended, followed by a second breakfast an hour or so later. In place of the milk, kumyss or kefir may be given.

Instead of large quantities of vegetables, starchy foods, such as macaroni, puddings and bread, may be prescribed—to all of which may be added plenty of butter.

"Mast-Kur" Combined with the Rest Cure at Home

When the rest cure is indicated the patient should be put to bed for four to six weeks, under the care of a tactful person, with family, friends and mail excluded.

Daily Schedule

a. m.

8	Clean up; clean teeth
8.30	Breakfast; rest until 9.30
9.30	Mild general massage, to be followed at
10.30	by bowel irrigation, warm bath, with local douches of cool water
11.30	Milk, matzoon, crackers; rest until 1 p. m.

p. m.

1	Lunch; rest until 4 p. m.
4	Abdominal massage
4.30	Milk, matzoon, sandwich
5.30	Alcohol rub

p. m.	
7	Dinner and rest
9	Wash up
9.30	Milk, matzoon, crackers; clean teeth
10	Turn out lights.

The Salt-Poor Diet

The salt-poor diet is based upon the observation that in Bright's disease the kidneys sometimes show deficiency in the elimination of chlorids. Hence a diet poor in—not free from—salt is advisable when a tendency to edema exists, in acute and chronic Bright's disease, in cardiorenal insufficiency, i. e., uremic symptoms, and when an exact examination of the urine shows retention of sodium chlorid.

It is part of this treatment to avoid all substances such as condiments, alcohol and radishes, which may irritate the kidneys, and to cut down on the quantity of meat. It is, however, not at all necessary to avoid all dark meat and to permit only white meat, such as fowl and veal.

A rational salt-poor diet is one which consists chiefly of toast or bread made without salt, fresh salt-free butter, milk—not more than one quart a day—boiled meat, vegetables—boiled for some time, the cooking water being discarded once or twice. But as such a diet is not at all appetizing for the patient it should be confined only to the conditions above mentioned.

The Purin-Free Diet

The purin-free diet is indicated in gout, which is characterized by the constant presence in the blood of uric acid, no matter whether the patient is on a mixed or a purin-free diet; usually there is either retention or a deficiency in the excretion of uric acid, which is the end product of the metabolism, not of albumen, but of the purin bases of the cell nucleins. Hence it is thought advisable to abstain from food rich in nucleins, such as liver, kidney and thymus.

A choice of the following list of foods constitutes a diet poor in purins: soups, made with prepared flour, milk, potatoes, green vegetables, cream, wheat bread, toast, butter, eggs, cheese, zwieback, honey, jellies, puddings, fruit.

It is well to give, with the above, ten drops of dilute muriatic acid in water during the meal.

Lenhartz' Diet for Gastric Ulcer and Hyperacidity

Lenhartz' method is directed towards combating the hyperchlorhydria and strengthening the patient's general condition by the administration of a concentrated egg albumen diet. His method is as follows:

Rest in bed for at least one month. Apply an icebag to the stomach

region for about two weeks to alleviate pain and to prevent excessi gastric fermentation.

During the first day, even after a hemorrhage, the patient receives to 9 ounces of iced milk in teaspoonful doses and two to four raw eg beaten up with a little sugar. By way of medication 30 grains of bismut subnitrate are given three times a day for ten days. The amount of foo is increased by one egg and three ounces of milk daily, but not more tha one quart should be given. This is continued for two weeks.

About the sixth day an ounce of raw chopped meat in divided doses i allowed. The next day this is increased to double the quantity. Fro then on to the end of the second week some well-cooked rice and zwiebac are given. In the third week a more liberal diet is allowed, avoidin however, all heavy food and vegetables likely to cause fermentation. A food must be thoroughly masticated.

If constipation exists the bowels are moved towards the end of th second week with glycerin suppositories or warm water injections. I the third week this may be done daily. Arsenic and iron may be give toward the end of the first week.

The patient is usually restored to health after six to ten weeks.

The Carlsbad Diet at Home

For those who cannot go abroad the following course is suggested fo taking the treatment at home:

Immediately upon rising take 8 to 16 ounces of Carlsbad Sprude Water, at 100° F., or one-half a teaspoonful of Carlsbad Sprudel Sal added to each glass of water. The water should be taken slowly and the patient is advised to walk about.

Breakfast.—The choice of the following may be had for breakfast: coffee, tea, cocoa, milk, soft-boiled eggs, lean ham, rolls, zwieback, toast, graham bread.

Luncheon and Supper.—Bouillon or vegetable soup; veal, fowl, fish, lamb, fresh pork, beef, ham, game; spinach, Brussels sprouts, cauliflower, asparagus, turnips, tomatoes, green corn, egg plant, green peas, beans, lentils, lettuce, cucumber, romaine salad; potatoes, noodles, macaroni, rice, bread, cottage or farina pudding; apple, peach, cherry, rhubarb pie; raw apples, peaches, oranges, plums, pineapple, cherries, bananas, peas, grapes; stewed apples, prunes, peaches, pears, apricots, plums; wine, beer, water, carbonated waters.

Afternoon Tea.—Tea, coffee, milk, zwieback, toast.

After Luncheon and Supper.—Lie down on right side for an hour. One or two glasses of warm or cold Carlsbad water should be taken an hour after meals and on retiring. Baths may be taken several times a week, adding two pounds of Carlsbad salt to each full bath. In addition,

gentle exercise should be taken in the form of gymnastics and massage, and the patient should walk at least twice a day for an hour or more.

Diet in Diabetes Mellitus

We know too little about the true nature of diabetes mellitus and the interrelation of the nervous system, internal secretions, pancreas and liver, as affecting this disease, to warrant laying down specific directions for a dietary regimen. Moreover, no two cases are alike, and what is good for one patient may not be adapted for another. The question of diet in diabetes still offers a very wide and profitable field for research and experimentation.

In general it may be said that it is wise to limit carbohydrates, which are the main source of the sugar eliminated in the urine. In a sense no food need be strictly prohibited to the diabetic patient, but it is often well for him to abstain from certain foods in order to have more leeway in another direction.

For All Diabetics.—The following foods are suitable for any—even the severest—case of diabetes:

Meats and Meat Preparations.—Fresh beef, veal, mutton, pork, ham, game, fowl—roasted, boiled or broiled—with its own sauce or with butter; tongue, heart, lung, brain, kidney, marrow—with sauces free from flour; ox tail, calf's feet, preserved meat, sausages free from bread or flour; peptone, albumose, nutrose, tropon; calf's foot jelly.

Fish, etc.—Fresh fish—boiled or broiled, with or without butter sauce; salted or smoked fish, sardines or sardelles in oil, anchovis, caviare, oysters, clams, crabs; Worcestershire sauce.

Eggs, Cream, etc.—Eggs—raw, boiled, or fried; fats; butter; olive oil; cream up to one-half pint a day; cheese.

Bread.—Gluten and brown bread, almond and cocoanut biscuits.

Vegetables.—Celery, fresh salads, tomatoes, fresh beans, onions, radishes, asparagus, rhubarb, cauliflower, spinach, cabbage, salt-pickles, sauerkraut, olives, haricots verts.

Soups.—Broths of meat or meat extract.

Desserts of eggs, cream, gelatin, if made with saccharin instead of sugar.

Drinks.—Mineral waters, cognac, rum, whisky; tea and coffee with cream and saccharin, if desired. Light Moselle, Rhine or Bordeaux wines.

Carbohydrates in Moderate Amounts.—The following list includes foods which contain moderate amounts of carbohydrates and which may be added in small quantities to the dietary of all but very severe cases. One, two or three items according to the severity of the case may be chosen for each meal: dried white beans, peas—made without sugar or flour, a small potato; a few nuts; fresh apples, pears, apricots, peaches, raspberries, wild strawberries, currants; stewed prunes, plums, cherries;

milk, three to four ounces; cocoa, one-half ounce; chocolate, one-half ounc

A bowl of oatmeal porridge for breakfast may be given to diabetic from whose dietary sugar and starches have been practically eliminated

Prohibited Foods.—Thick soups; liver; ordinary bread, rye, wheaten brown or white, except in small quantities; hominy, rice, tapioca, arrow root, sage, vermicelli; potatoes, turnips, parsnips, squashes, beets, carrots artichokes. (For specimen diet extending over one week, *see* Treatment o Diabetes.)

Vegetarianism

From a study of the following menu, issued by the Battle Creek San itarium, it will be seen that the dietary is made up of a proper variety o proteids, carbohydrates, and fats and is calculated to exert a favorable influence on overfed individuals. The beneficial effects of vegetarianism do not depend upon the fact of its followers not taking animal food, but on their giving up former bad habits.

A Vegetarian Menu

DINNER

SOUPS

Cream of Peas Fruit

ENTREES

Broiled Nuttolene—Tomato Sauce
Sliced Savory Protoso
Nut Roast with Potatoes

RELISHES AND SALADS

Celery Apple and Banana

VEGETABLES

Sliced Tomatoes Stewed Navy Beans
Green Corn Potatoes

DEXTRINIZED GRAINS

Toasted Whole-wheat Wafers
Granose Flakes Granola Porridge
Granut Zwieback Roasted Rice
Browned Granose Biscuits
Granola Dry Gluten
Toasted Wheat Flakes

CEREALS

Farinose—Grape Sauce
Granola Porridge—Raisins

LIQUID FOODS AND BEVERAGES

Vegetable Broth Caramel-cereal
Gluten Gruel Grape Gruel Dairy Cream
Sterilized Dairy Milk Almond Cream

FERMENTED BREADS

Coarse Graham Bread Fine Graham Bread
White Bread

UNFERMENTED BREADS

Beaten Biscuits
Graham Crackers Passover Bread
Crisps

COOKED FRUITS

Prunes Peaches Strawberries

FRESH FRUITS

Plums Peaches Cantaloupe

DESSERTS

Shelled Walnuts Bread Pudding

ARTICLES SERVED TO ORDER

Carbon Crackers Gluten Biscuit No. 1
Gluten Wafers Dyspeptic Wafers
Popped Corn
Vegetable Bouillon
Junket Buttermilk Kumyss Kumyzoon
Milk with Lime Water
Tomato Sauce Stewed Tomatoes
Corn Pulp Granose Balls Protose Patties
Floated Eggs Eggnog
Green Pease Bean Puree Pease Puree
Milk Custard Prune Marmalade

MALTED FOODS

Malt Honey Maltol Malted Nuts
Sanitas Food Bromose

Strictly Vegetarian Diet [1]

To assist in carrying out a strictly vegetarian diet, a diet list for cancer is here given, which should be closely adhered to. Coffee, chocolate and cocoa, as also alcoholic drinks, even beer, are harmful and must be avoided. The rules given at the end are also to be strictly observed.

Diet for Cancer

FIRST DAY

Breakfast.—4 ounces rice, 3 ounces corn bread, 1¼ ounces butter, ½ ounce sugar, hot water.

Dinner.—5 ounces vegetable soup, 3 ounces baked potatoes, 3 ounces stewed celery, 1 ounce graham bread, 1¼ ounces butter, 1 fresh apple.

Supper.—4 ounces rolled oats, 2 ounces white bread, 1¼ ounces butter, 4 ounces stewed prunes, ¼ ounce sugar, very weak tea.

SECOND DAY

Breakfast.—Orange, 4 ounces hominy, 2 ounces graham toast, 1¼ ounces butter, ½ ounce sugar, postum.

Dinner.—5 ounces pea soup, 3 ounces macaroni, 3 ounces string beans, 3 ounces carrots, 2 ounces bread, 1¼ ounces butter, dates.

Supper.—4 ounces cream of wheat, 2 ounces graham toast, 1¼ ounces baked apple, 2 ounces crackers, 1¼ ounces butter, ¼ ounce sugar, very weak tea.

THIRD DAY

Breakfast.—Banana, 4 ounces Pettijohn, 2 ounces white bread, 1¼ ounces butter, ½ ounce sugar, hot water.

Dinner.—5 ounces corn soup, 3 ounces baked potatoes, 3 ounces spinach, 3 ounces boiled onions, 2 ounces bread, 1¼ ounces butter, raisins.

Supper.—4 ounces farina, 4 ounces stewed figs, 2 ounces graham crackers, 1½ ounces butter, ¼ ounce sugar, very weak tea.

FOURTH DAY

Breakfast.—Raw apple, 4 ounces cornmeal mush, 2 ounces graham bread, 1¼ ounces butter, ½ ounce sugar, postum.

Dinner.—5 ounces vegetable soup, 4 ounces baked beans, 3 ounces cauliflower, 3 ounces asparagus, 2 ounces bread, ¼ ounce butter, orange.

Supper.—4 ounces rice, 4 ounces stewed prunes, 2 ounces graham crackers, 1¼ ounces butter, ¼ ounce sugar, very weak tea.

[1] Administered at the New York Skin and Cancer Hospital in cancer cases.

FIFTH DAY

Breakfast.—Orange, 4 ounces cracked wheat, 3 ounces corn muffins, 1¼ ounces butter, ½ ounce sugar, hot water.

Dinner.—5 ounces sago soup, 4 ounces spaghetti, 3 ounces Lima beans, 3 ounces boiled onions, 1¼ ounces butter, dates.

Supper.—4 ounces cream of wheat, sliced orange, 2 ounces oatmeal crackers, 1¼ ounces butter, ¼ ounce sugar, very weak tea.

SIXTH DAY

Breakfast.—4 ounces samp, 2 ounces graham toast, 1¼ ounces butter, ½ ounce sugar, postum.

Dinner.—5 ounces celery soup, 4 ounces baked potatoes, 3 ounces carrots, 3 ounces spinach, 1¼ ounces butter, 2 ounces bread, figs.

Supper.—4 ounces wheatena, 4 ounces stewed figs, 2 ounces uneeda biscuit, 1¼ ounces butter, ¼ ounce sugar, very weak tea.

Repeat this bill of fare on successive days.

Some interchange of the different articles may be made, to suit the appetite or convenience of patients; but in the main this bill of fare should be followed.

Bread at least 24 hours old may be taken as desired.

A little old cheese may be grated on the macaroni and spaghetti, but not cooked with it.

One boiled or poached egg may be taken for breakfast every other day, and very fat bacon on the alternate days, unless otherwise directed by the physician.

It is desirable to eat the skin of potatoes.

Each and every meal should be eaten very slowly, for half an hour, with long chewing.

One tumbler of water is to be taken with each meal, but not when food is in the mouth; also a tumbler full of hot water, one hour before breakfast and supper.

No milk is to be taken unless specially ordered.

The cereals are to be boiled with water, three or four hours, and may be cooked in the afternoon and heated in the morning, adding more water. Rice, farina, and cream of wheat require only an hour. Chopped dates, figs, raisins, or currants may be added to cereals when desired.

All the cereals are to be served very hot, on hot plates, and eaten with butter and salt to taste (not milk and sugar). They are to be eaten very slowly with a fork, and very well chewed.

The crackers with supper may be varied to suit the taste; they should be eaten dry, with butter, and chewed very thoroughly.

Nothing should be taken between meals, unless especially directed, and

the life should be as simple and healthful as possible, with early and long bed hours.

The Salisbury Diet System

The Salisbury diet system is applicable to all diseases produced by improper feeding; in general, obesity, anemia, all gouty and sclerotic conditions, those in which fatty changes are suspected (Bright's disease), rheumatism and those conditions accompanying the so-called uric acid diathesis, diabetes mellitus, epilepsy and some forms of dyspepsia.

The Salisbury diet is based upon the assumption that many diseases—especially those which are called intractable and incurable—have their beginning in long-continued indiscreet feeding, and that by removing the causes and substituting a certain diet, cures could be perfected in most cases.

The essentials of the diet are the drinking of *hot water* and living on a carefully prepared diet, consisting chiefly of *minced lean beef—broiled.*

The water is to cleanse the entire body and to keep the stomach clean. The lean meat is to build up blood and healthy tissue with the least expenditure of energy. The water should be sipped as hot as the patient can bear it: one pint one hour before each meal, one pint one hour and one-half after each meal, and one-half an hour before bedtime.

For a change from the broiled muscle pulp of beef, the patient may eat broiled beefsteak, roast beef, and broiled or roast lamb or mutton—all of which meats should be free from fat; oysters, raw, broiled or roasted in the shell; broiled or boiled fish; chicken, game and turkey—broiled or roasted; salt, pepper, Worcestershire sauce, celery and chutney in moderation. All meats should be well cooked and must be taken regularly, either slowly or in the company of others who take the same diet.

Under this diet it is claimed that gaseous distention and adipose tissue will rapidly disappear and that changes in the blood will soon be noticed. If the loss of weight be too rapid, such food as bread, toast, rice, cracked wheat and baked potatoes may be added. When the desired weight has been reached a diet of two parts of meat to one part of vegetables is advised.

A not unessential part of the treatment consists in observing moderation in bodily exercises, avoiding profound mental and bodily fatigue: calmness of mind and avoidance of irritation of the patient are essential for a cure of the chronic condition. Emphasis is also laid upon the importance of fresh air, the amount of out-of-door life and exercise suitable for the various diseases, and proper hygiene—such as massage, daily baths, strict cleanliness and proper underwear.

Tobacco in moderation is not contra-indicated and stimulation with drugs in cases where loss of weight seems too rapid is advisable.

Binding Diet for Diarrheal Conditions

(*a*) **Adults.**—Burnt flour gruel, barley gruel; noodles; rice, tapioca sago, farina; toast, crackers, corn meal muffins; mashed potatoes, baked potatoes; scrambled or poached eggs; bread soup, noodle soup; fresh clam broth; scraped beef; calf's foot jelly; claret or red Burgundy wine; black tea; boiled or cooled water.

(*b*) **Young Children.**—Burnt flour gruel,[1] barley gruel; rice, tapioca sago, farina; egg white in water; gum arabic in water; corn starch pop slippery elm decoction; black tea; boiled water.

Many other diet regulations are emphasized throughout the book.

Food Values in Household Measures

Caloric Requirements[2]

First three months, requirement	..... 100 cal.	per kg.
Second " "	..... 90 "	"
Third " "	..... 80 "	"
Fourth " "	..... 70 "	"
Older children "	.....30-35 "	per lb.
Adults "	...2,000-4,000 "	per day

Abbreviations

a.—average
a.h.—average helping
c.—cup—250 c.c.
d.—diameter
dsp.—dessertspoon—10 c.c.
tbsp.—tablespoon—15 c.c.
tsp.—teaspoon—5 c.c.
tbl.—tumbler—250 c.c.
sh. gl.—sherry glass—30 c.c.
cl. gl.—claret glass—120 c.c.
c. gl.—cordial glass—20 c.c.

SOUPS

FOOD	PORTION	QUANTITY	CALORIES
Beef juice.....	a.h.	4 oz.	30
Green pea.....	"	8 oz.	128
Cream of barley.....	"	"	120
Cream of macaroni.....	"	"	113
Lentil	"	"	112
White bean.....	"	"	111

[1] *How to Prepare Burnt Flour Gruel.*—Melt a teaspoonful of butter in a pan, add a heaping tablespoonful of flour, heat and stir until a brown ball is formed, add slowly one pint of boiling hot water, stirring all the time, and boil to a thick gruel or soup. Add salt to taste.

[2] Compiled from E. A. Locke's "Food Values" and other sources.

FOOD	PORTION	QUANTITY	CALORIES
Macaroni and tomato	a.h.	oz.	105
Split pea	"	"	100
Tapioca and tomato	"	"	90
Corn	"	"	90
American vegetable	"	"	85
Scotch broth	"	"	84
Clam chowder	"	"	82
Mock turtle	"	"	100

MEATS

FOOD	PORTION	QUANTITY	CALORIES
Corned beef	a.h.	1 slice	140
Roast beef	"	1 "	350
Scraped beef	"	4 inch pat	180
Round steak	"	1 slice	185
Tenderloin	"	1 "	285
Tongue	"	1 "	75
Chicken, fricasseed	"		190
Chicken, roast	"		180
Chicken, creamed, on toast	"	2 h. tbsp.	270
Lamb chop	"	1 chop	360
Lamb, roast	"	1 slice	150
Mutton, boiled	"	1 "	126
Mutton chop, lean	"	1 chop	135
Mutton, roast leg	"	1 slice	234
Pork chop	"	1 chop	113
Pork, roast	"	1 slice	210
Ham	"	1 "	140
Sausage	"	1 sausage	164
Bacon	"		194
Turkey	"		285
Veal cutlet	"	1 cutlet	104
Veal, roast	"	1 slice	97
Calf's foot jelly	"	1 h. tbsp.	45

FISH

FOOD	PORTION	QUANTITY	CALORIES
Fish, all kinds	a.h.		100 to 150
Salmon	"		200
Sardine	"	1 sardine	28
Smelts	"	1 fish	12
Brook trout	"	1 "	60
Caviare	"	1 h. tsp.	34

SHELL FISH

FOOD	PORTION	QUANTITY	CALORIES
Clams	a.h.	6 clams	75
Scallops, fried	"	3 h. tbsp.	158
Crabs	"	1 crab	106
Lobsters	"	½ lobster	90
Oysters, raw	"	6 oysters	44
Oysters, creamed	"	6 on toast	300
Oyster stew	"	½ pint	340
Oyster fry	"	6 large oysters	255

DAIRY PRODUCTS

FOOD	PORTION	QUANTITY	CALORIES
Butter	a.h.	1 ball	120
Cream (average)	"	1 tbsp.	54
Cream (whipped)	"	1 h. tbsp.	80
Cream (thick)	"	1 tbsp.	108
Milk (whole)	"	1 glass	150
Milk (condensed, sweet)	"	1 tbsp.	87
Milk (cond., unsweetened)	"	1 tbsp.	34
Milk (skimmed)	"	1 glass	84
Buttermilk	"	1 "	80
Whey	"	1 "	56
Koumyss	"	1 cl. gl.	70
Cheese, all kinds	"	1 cu. inch	60 to 90

EGGS

FOOD	PORTION	QUANTITY	CALORIES
Eggs		1 egg	80
Egg white		1 "	20
Egg yellow		1 "	60
Omelette	a.h.		175

VEGETABLES

FOOD	PORTION	QUANTITY	CALORIES
Artichoke	a.h.	1	97
Asparagus	"		22
Beans, baked	"	3 h. tbsp.	306
Butter beans	"	4 "	65

FOOD	PORTION	QUANTITY	CALORIES
Lima beans	a.h.	2 h. tbsp.	128
String beans	"	2 "	13
Beets	"	2 "	30
Cabbage	"	3 "	5
Carrots	"	3 "	18
Cauliflower	"	2 "	8
Celery, creamed	"	3 "	66
Celery, raw	"	3 small stalks	9
Corn	"	2 h. tbsp. or 1 ear	100
Cucumbers	"	8 slices	9
Mushrooms	"	2 large	20
Onions	"	1 onion	40
Parsnips	"	4 slices	10
Peas	"	3 h. tbsp.	100
Potatoes, baked or boiled	"	1 medium	100
Potatoes, mashed	"	2 h. tbsp.	110
Potatoes, chips or fried	"	3 "	295
Rhubarb, stewed	"	2 "	146
Rice	"	2 "	70
Squash	"	2 "	69
Spinach	"	2 "	57
Tomatoes, canned	"	2 "	16
Tomatoes, raw	"	1 medium	46
Turnips	"	2 h. tbsp.	6

FRUITS

FOOD	PORTION	QUANTITY	CALORIES
Apples and pears	a.h.	1	75 to 90
Apple sauce	"	2 h. tbsp.	140
Banana	"	1	125
Cantaloupe	"	½	90
Grape fruit with sugar	"	½	140
Grapes	"	1 bunch (medium)	110
Peach	"	1	40
Orange	"	1	90
Watermelon	"	Large slice	40
Plum	"	4-6	30
Pineapple	"	2 slices	44
Berries and cherries	"	3 h. tbsp.	40 to 50
Figs, dates, prunes, raisins, jellies, marmalade	"	2 oz.	200 to 350

BREAD—CRACKERS—CAKE

FOOD	PORTION	QUANTITY	CALORIES
White bread	1 slice	1 oz.	80
Rye bread	1 "	1 1/3 "	102
Graham bread	1 "	1 1/3 "	100
Brown bread	1 "	2 2/3 "	186
Whole wheat bread	1 "	1 1/2 "	106
Toast	1 "	1/3 "	30
Buns, rolls	1 bun		150
Zwieback	1 slice	1/2 "	65
Crackers	1 cracker		15 to 40
Ginger snaps	1		20
Sponge cake, lady fingers	a.h.	1 "	100
Cookies		1 cookie	20 +
Rich cake	"	1 oz.	110
Pie, pastry	"		250 to 350

PUDDINGS—VARIOUS KINDS

FOOD	PORTION	QUANTITY	CALORIES
Puddings, various kinds	a.h.	2 h. tbsp.	200 (averag
Snow pudding	"	2 "	70
Blanc mange	"	2 "	130
Egg soufflé	"	4 "	200
Floating island	"	3 "	150
Spaghetti	"	3 "	150

CEREALS

FOOD	PORTION	QUANTITY	CALORIES	
Farina	a.h.	2 h. tbsp.	50	
Force	"	5 "	60	with
Grape nuts	"	5 "	240	milk
Puffed rice	"	5 "	54	or
Shredded wheat	"	1 biscuit	109	cream
Boiled rice	"	3 h. tbsp.	105	extra
H. O., boiled	"	2 "	70	

GRUELS

FOOD	PORTION	QUANTITY	CALORIES
Oatmeal with milk	a.h.	7 h. tbsp.	300
Barley with milk	"	4 "	138

SAUCES—DRESSINGS

FOOD	PORTION	QUANTITY	CALORIES
Cream sauce	a.h.	3 h. tbsp.	90
French dressing	"	1 dsp.	75
Mayonnaise	"	1 tbsp.	187
Wine sauce	"	3 "	97

SUGAR

FOOD	PORTION	QUANTITY	CALORIES
Domino		1 domino	25
Granulated		1 h. tbsp.	40
Honey		1 tbsp.	100

NUTS

FOOD	PORTION	QUANTITY	CALORIES
Almond		10 large	100
Brazil nuts		10 "	430
Chestnut	handful	20 nuts	104
Filbert		10 "	72
Peanuts	"	15 "	128
Pecans		10 large	230
Walnuts		10 "	306

BEVERAGES

FOOD	PORTION	QUANTITY	CALORIES
Cocoa		1 cup	279
Coffee or tea		1 "	156
Eggnog		1 glass	294
Lemonade		1 large glass	250
Malted milk		1 cup	220
Brandy		cl. gl.	70
Gin		cocktail gl.	116
Cocktail		"	130
Whisky		1½ oz.	152
Benedictine		c. gl.	90
Wines, red and white		cl. gl.	90
Champagne		"	130
Sherry, Tokay, Malaga, Port		sh. gl.	40
Cider		1 gl.	120
Beer, ale, porter		1 "	150 (average)

MISCELLANEOUS FOODS

FOOD	PORTION	QUANTITY	CALORIES
Ice cream	a.h.	2 h. tbsp.	190
Water ices	"	2 "	150
Ham sandwich	"		230
Chicken sandwich	"		160
Butter sandwich	"		245
Egg sandwich	"		236
Jam sandwich	"		227
Prune sandwich	"		240
Cheese sandwich	"		250
Pot cheese sandwich	"		212
Apple jelly sandwich	"		240

Hydrotherapeutic Memoranda

The principles of hydrotherapy are simple, yet to apply the many methods requires experience and careful management; hence only those methods shall be mentioned here which may be employed under the physician's directions by the average person.

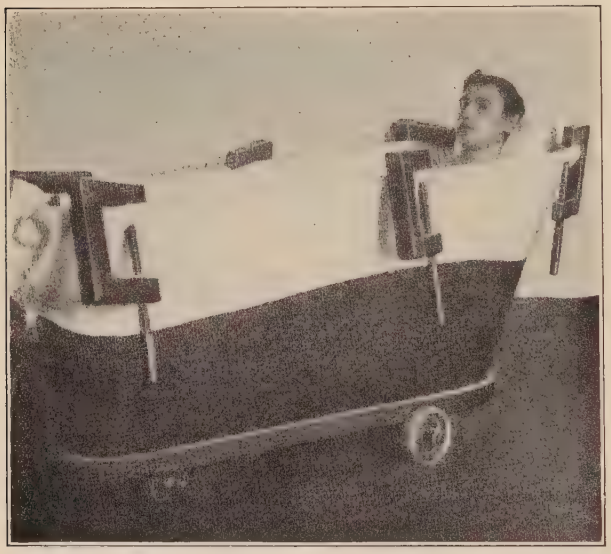

FIG. 5.—PERMANENT BATH (IMPROVISED). (Schwalbe.)

Cold Water.—The application of cold water results in a primary contraction of the blood vessels which is followed by the *reaction;* this consists in a dilatation of the vessels of the skin at the point of application and a general stimulation of the entire system.

The beneficial effect of cold water application depends upon the degree of this reaction. Persistent shivering or discomfort, instead of a feeling of well-being and buoyancy, is a sign of poor reaction either from a careless or faulty application or a deficient power of the patient to react. A

change to a less strenuous method should then be made by cutting down the time of exposure or using water which is less cold, or putting the patient to bed before the treatment, to warm up his skin. The time of exposure should never be too long—a few seconds often suffices. The room should be warm if possible. Friction or the addition of salt to the water or the drinking of hot water will increase the reaction. To prevent

FIG. 6.—PERMANENT BATH. (After Hoxie, "Symptomatic and Regional Therapeutics.")

congestion to the head, the head and neck may be washed with cold water or an ice bag may be applied.

Hot Water.—The simple application of hot water to the surface of the body does not cause an increase in temperature. The body reacts to heat application by increased superficial circulation, heat elimination and perspiration. Prevention of heat elimination, however, by wrapping the patient up in wool or rubber cloth is followed by increased temperature which is subject to regulation by still greater sweat secretion.

Congestion to the head may be prevented by previously bathing the head and neck with hot water or by applying an ice bag.

No applications should be made immediately after a heavy meal.

General Baths.—General baths are given cold, lukewarm or hot with the patient submerged to the neck.

Cold Baths.—Cold baths, at a temperature of 60° to 75° F., have a stimulating effect upon circulation, respiration, metabolism and the eliminating functions, also the nervous and muscular systems. In fever the temperature is usually lowered by cold baths. Friction to the skin should be applied during a cold bath in febrile cases.

Lukewarm Baths.—Lukewarm baths are given at a temperature of

Fig. 7.—Wet Pack (Schwalbe).

75° to 90° F. They are much to be preferred for delicate persons or in winter or for patients who have never practiced cold bathing.

Warm Baths.—Warm baths, at a temperature of from 90° to 115° F., are sedative in their effects, patients afterward often showing a desire for rest or sleep.

To Reduce Temperature in Typhoid and Other Fevers.—The following method is effectual and not too unpleasant for the patient. He is placed in a sitting position into the water at 80° F., which is cooled off to 60° by gradually adding cold water. The skin is rubbed briskly all the time, that is, during five to ten minutes. The chest and back are bathed by pouring on water taken from the tub.

Carbonic Acid and Brine Bath (*Nauheim Baths*).—For the treatment of cardiac insufficiency, general debility, anemia, skin diseases, neurasthenia, chronic rheumatism, when a course of treatment at Nauheim,

Kissingen or Saratoga is not feasible, carbonic acid brine baths can be improvised at home. The material is sold under various names (Zeotoo Nauheim Bath and Fraser's Carbonic Acid Bath). It consists of a powder and a developing fluid.

These are distributed throughout the bath, which will soon be charged with bubbles of carbonic acid gas. The bath should be taken for a period

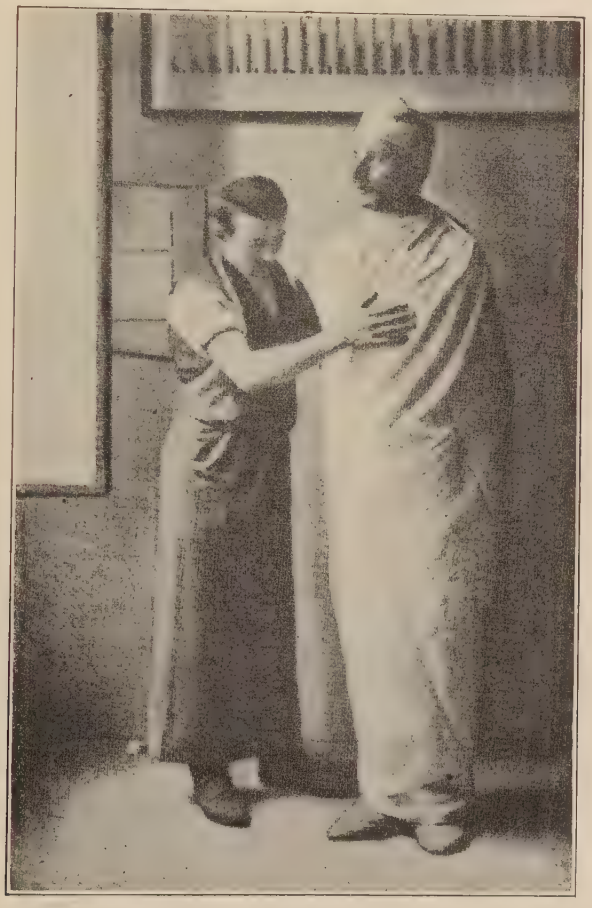

Fig. 8.—Wet Pack and Rub (Schwalbe).

of ten minutes at the beginning, gradually increasing the time to fifteen minutes. A course of treatment consists as a rule of from twenty to thirty baths.

Contra-indications are: kidney diseases, arteriosclerosis, tuberculosis, diabetes mellitus.

Under the State supervision CO_2 baths are now administered at Saratoga Springs.

In order to get the Nauheim results salines should not be omitted in the carbonic acid bath. The object of this form of treatment is to raise the response capacity of the heart muscle and of the ventricular action by reducing obstacles to the peripheral circulation. Passive and regulated active exercises are to be employed in connection with the baths.

The Permanent Bath.—In extensive burns it is better to use the

FIG. 9.—WET PACK; CHEST AND ABDOMEN (Schwalbe).

permanent bath, which can be improvised. By this bath we exclude air from raw surfaces and keep wounds clean and stimulate repair. The water is kept constantly flowing at body temperature; the patient may be kept therein for forty-eight hours.

In extensive chronic skin lesions patients may live in a permanent bath for months.

Local Baths.—COLD SITZBATHS.—The patient sits in the water to the level of the umbilicus and remains there for ten to fifteen minutes. A contraction of the blood vessels is followed by dilatation and increased circulation both in the vessels of the skin and of the abdominal organs. When of short duration cold sitzbaths inhibit excessive muscular contrac-

tion, increase intestinal peristalsis and contract the musculature of uterus and bladder. When of long duration these latter effects cease.

Hot Sitzbaths.—These produce considerable dilatation and congestion in the vessels of the skin and of the abdominal organs. They are analgesic in their effects and stop cramps and other muscular contraction.

Cold Footbaths.—Cold footbaths at 45° to 60° F. stimulate reflexly the circulation in the abdomen, pelvis and meninges as well as muscular contraction of uterus, intestine and bladder.

Hot Footbaths.—Hot footbaths, at 105° to 118° F., effect depletion

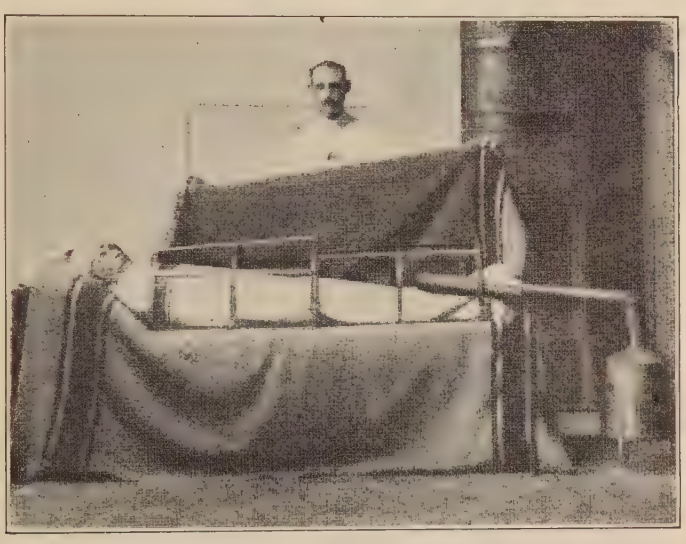

Fig. 10.—Hot Pack (Schwalbe).

of the blood vessels, especially of abdomen, head and brain. If prolonged they act as a soporific.

Drip Sheet and Cold Pack.—This method may be employed for its stimulating and diaphoretic effect. A large sheet is dipped in moderately cold water at 60° F. and wrung out well. This is placed upon the bed, which is protected by a rubber sheet. The patient is wrapped in the moist sheet so that only the head protrudes, and is then covered with blankets. This procedure may be repeated several times.

Hot Pack.—This is used to produce intense perspiration in uremia, etc. The patient is wrapped in a sheet wrung well out of water at 110° F. and covered with woolen blankets. This may be repeated frequently.

Wet Compress for the Chest.—A linen sheet is folded to fit around the patient's body from clavicle to navel and wrung out of water at 60° F. It is then spread out on a flannel sheet somewhat larger than the compress, is placed under the patient's back and completely around the chest and secured by safety pins. This compress may be changed every hour, and

its action is antithermic and stimulating, rousing the patient from stupor, furthering elimination and increasing leukocytosis—all of which are desired in the management of various forms of infectious febrile disease, particularly in lobar pneumonia and bronchopneumonia.

FIG. 11.—AURAL ICE BAG APPLIED (Schwalbe).

Hot-air and Hot-steam Baths.—These can be improvised by seating the patient on a cane chair with a blanket surrounding all. A spirit lamp underneath the chair heats the air or the water. The baths promote diaphoresis, thereby eliminating toxins. In acute and chronic Bright's

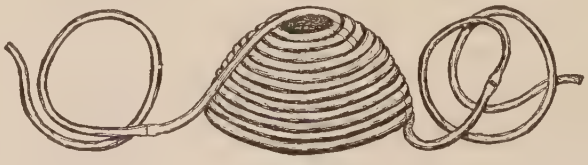

FIG. 12.—LEITER COIL FOR HEAD. (After Hoxie, "Symptomatic and Regional Therapeutics.")

disease, acute and chronic articular rheumatism, gout, sciatica and other forms of neuritis, diaphoretic baths are of great value.

Hot-air Box for Local Hot-air Baths.—This is an ovenlike apparatus,

of various shapes made to fit body or limb, and heated by an alcohol lamp, gas or electricity, by which dry heat at a temperature of up to 300° F. may be applied to chronic inflammatory conditions—especially in rheumatism, arthritis and neuritis.

The affected part is wrapped in a blanket and exposed to the hot-air treatment for up to three-quarters of an hour. Profuse perspiration follows and the body temperature may become slightly increased.

Hot-water Bag.—The hot-water bag is chiefly used for alleviation of local pain, such as earache, cramps in abdomen and to stimulate circulation. Sometimes the ice bag is preferred in painful conditions.

If no rubber bag is at hand, hot sand placed in a small sack may be substituted, or a flannel sheet may be dipped in very hot water and wrung out well, wrapping another sheet around it to protect against burns.

FIG. 13.—LEITER COILS FOR ABDOMEN OR CHEST. (After Hoxie, "Symptomatic and Regional Therapeutics.")

Ice Bag and Ice-water Coil.—The ice bag and ice-water coil are often used to subdue pain or to reduce inflammation, for instance, in appendicitis. The ice-water coil is used for the same purpose as the ice bag and is often preferred, as it avoids disturbing the patient by replenishing the ice in the bag.

Tonic Hydrotherapy[1]

Graduated Neurovascular Training.—CARDINAL RULE.—All water applications below 90° F. must be made with friction.

FIRST STAGE.—*Ablution.*—Avoid extremities below knee and elbow. (*a*) Begin with 90° F. with saturated linen cloth or gloved hand. (*b*) Pass rapidly over successive parts. (*c*) Dry thoroughly. (*d*) Dress and exercise in open air in ambulant cases. (*e*) Reduce temperature of water daily two or more degrees, until 60° F. is reached.

SECOND STAGE.—*Affusion.*—(*a*) Patient stands in water at 105° F. (*b*) From a bucket of water at 85° F. water is dipped and thrown over back, each shoulder and chest. (*c*) Dry, dress and exercise in open air. (*d*) Reduce water temperature daily 5° or more to 60° F. (*e*) If reaction is good, proceed to third stage.

THIRD STAGE.—*Cold Rub.*—(*a*) Patient stands in water at 105° F. (*b*) A linen sheet is wrung out with water at 80° F., decreased daily. (*c*) Damp sheet is wrapped over body snugly. (*d*) Patient is actively rubbed over sheet until sheet is warm. (*e*) Dry, dress and exercise in open air.

[1] As practiced by Dr. Simon Baruch, New York.

(*f*) Reduce temperature of water 5° to 10° daily to 50° F. if reaction is good. Then proceed to drip sheet.

Drip Sheet.—(*a*) Patient stands in water at 105° F. (*b*) Upper edge (12 inches) of linen sheet is gathered into folds. (*c*) Sheet is dipped in water at 80° F. (*d*) The dripping sheet is held by attendant while patient wraps himself into it by turning the body. (*e*) Friction and slapping with flat hands for two minutes. (*f*) Pour water at 70° F. over

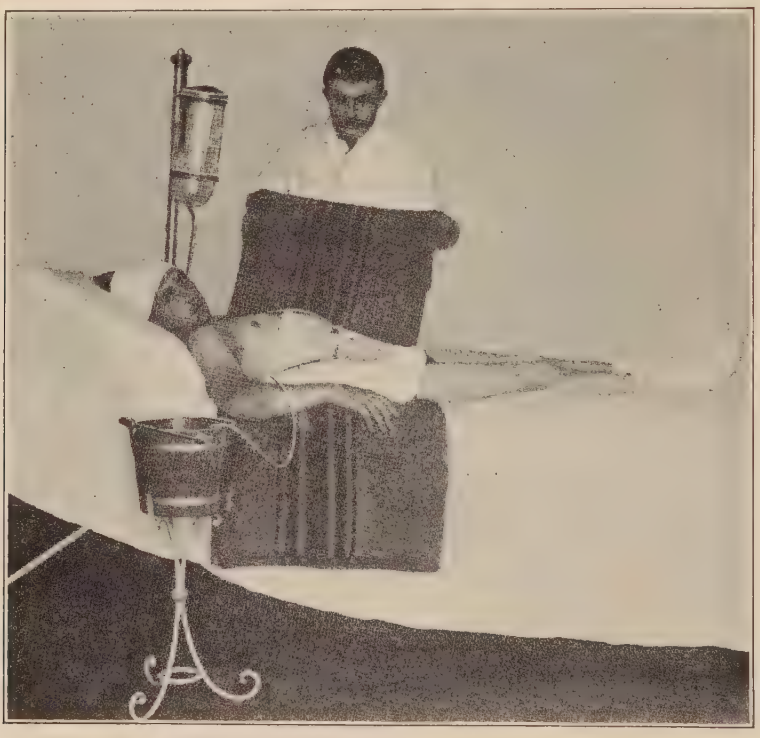

Fig. 14.—Leiter Coil Applied (Schwalbe).

shoulders. Rub and slap again until sheet feels warm. (*g*) Repeat this over successive parts of body, rapidly. (*h*) Sheet removed. Patient dries, dresses, and exercises. (*i*) Reduce water temperature daily until 50° F. is reached.

In small sanatoria and in private practice the douche may be replaced by the drip sheet.

Douche for Neurovascular Training.[1]—To facilitate the application of water in many chronic diseases requiring tonic or restorative effects, Dr. Simon Baruch, of New York, has devised a simple douche apparatus by means of which the temperature, duration, and pressure may be ar-

[1] Baruch, Dr. Simon, *Med. Rec.*, Aug. 1, 1914.

ranged with precision for purposes of exact dosage. The apparatus may be secured on the wall of a douche room constructed of waterproof walls and floor, size 8′ x 12′, on the left of its entrance. The patient, standing at the other end, receives the douche, first upon the posterior part of the body and later upon the anterior part of the body, from the doucheur, who stands at the opposite end, grasping the nozzle. Before the patient enters the room the attendant arranges the temperature and pressure prescribed. He then places the patient in position and administers the douche. The direct stream is called the jet douche; by holding the point of the index finger of the hand which grasps the nozzle over the opening, the stream will form a fan. This is the milder form of douche—fan douche.

Fig. 15.—Apparatus for Stomach Lavage.

The middle of the floor must be covered by a slatted walk 2′ wide and 12′ long, upon the distal extremity of which the patient stands. This prevents his walking on the wet floor. After treatment he is dried, rubbed, and sent into the open air.

The douche may be administered daily or less frequently, the former being the most useful. The effect is enhanced by a preceding warming of the skin either by wrapping the body snugly in woolen blankets for a half hour or longer or by exposing the patient to hot air or electric light in a box arranged for that purpose.

The first treatment is given at a temperature of 95° F.—20 lbs. pressure and one minute duration. The patient is dried, rubbed, and sent into the open air; on the following day the temperature is changed to 93° F., on the next following day to 90° F. This daily reduction of temperature is continued until the lowest temperature the patient is able to respond to without uncomfortable chilling after he goes into the air and exercises is

reached and so continued. If at any time persistent chilling is produced, the treatment may be shortened one-half or less and gradually increased in duration and pressure. The chief point is that chilling may be obviated by increasing pressure and diminishing duration, never by increasing the temperature of the douche. The coldest douche under strongest pressure

FIG. 16.—METHOD OF WASHING OUT THE STOMACH. (After Strümpell, "Text-book of Medicine.")

is the most stimulating. A medium temperature about 70° F. to 60° F. of two minutes' duration and 20 pounds pressure would give a more prolonged—a tonic—effect. The temperature of the water must never be lowered during the douche.

Bearing these facts, which are the result of thousands of recorded treatments, in mind, no harm could come to the feeblest patient who is able to walk to the douche room. Whenever iron, strychnin, phosphates,

or other tonics or so-called blood or nerve restorers are indicated, this neurovascular training will serve a far superior purpose in immediate refreshment and more rapid and enduring tonic effect.

The apparatus is made by the Hydrotherapeutic Apparatus Co., New York City. Its cost is about one-fourth of that of the regular douche table.

Lavage—Irrigations

A. Lavage

Lavage of the Stomach.—This is a procedure which every physician will be called upon to perform many times during his career, because of the numerous conditions in which it is indicated. These are: in poisoning, to remove whatever poison is still in the stomach—except when mouth and esophagus are severely burnt; in stagnation due to pyloric stenosis from new growths; contracted healed ulcers; spasms of the pylorus; atony and ptosis. In intractable diarrheas gastric lavage often gives surprising

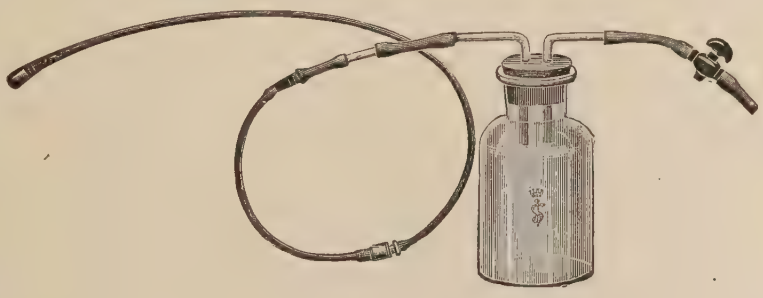

Fig. 17.—Apparatus for Transduodenal Lavage (Dr. M. E. Jutte, New York).

results by removing gastric fermentation. In chronic gastric catarrh, hypersecretion and hyperchlorhydria, it is a useful measure, and even in severe gastric hemorrhages, in which lavage may seem to be contra-indicated, it has given good results.

It is contra-indicated in senility, aneurism and in severe affections of the heart and lungs.

Apparatus.—The simplest apparatus consists of a soft rubber tube, several feet of connecting rubber tubing and a funnel holding one or two pints. A rubber bulb may be interposed to facilitate syphoning. The tube should not be too thin and should have one or two lateral windows.

Mode of Procedure.—One or two funnelfuls of lukewarm boiled water, to which a teaspoonful of sodium bicarbonate may be added, are allowed to run into the tube, and are then syphoned out by lowering the funnel. This is repeated until the water returns clear. The patient should pref-

erably be placed in a sitting position, but if weak or if the stomach is large and dilated it is better to have him lie down.

For children a fountain syringe is connected by tubing with a soft rubber catheter—No. 12 or 14; between them a glass T-canula is interposed. A waste tube is attached to the third end of the canula.

The child is tightly held upright on the nurse's lap with his head bent slightly forward to prevent aspiration of vomited material, and the catheter

Fig. 18.—Bladder Irrigation (Schwalbe).

is passed into the stomach in the ordinary way or, if unruly, through the nostrils.

In children stomach lavage is particularly indicated to remove irritating contents in cholera infantum, in stomach atony in chronic indigestion, and in persistent vomiting (acute gastritis).

The *best time for gastric lavage* is in the morning before breakfast, or six to seven hours after a meal—that is, at a time when the stomach should be empty. In catarrh and gastric neuroses lavage on alternate days will often suffice, but in retention due to stenosis daily lavage is usually indicated.

Many people will get so used to the treatment that they may be trained

to perform the operation on themselves, thus saving them much inconvenience and expense.

Weak antiseptic solutions are indicated especially in fermentation and stagnation, but also in chronic catarrh and in some forms of diarrhea.

Transduodenal Lavage.—Transduodenal lavage was first suggested by Dr. M. E. Jutte of New York, for intestinal auto-intoxication and other pathological conditions arising therefrom.

Mode of Procedure.—It is given through a thin rubber tube, which is introduced directly into the duodenum. To prevent as far as possible absorption of water by the intestine, physiological salt or even a hypertonic solution, plain or medicated, is employed. The reason for bridging the stomach, instead of simply letting the patient swallow the fluids, is the intolerance of the stomach toward the solutions employed (nausea, vomiting), and because the control of the pylorus must be broken, a certain volume of irrigating fluid being necessary to flush the intestine.

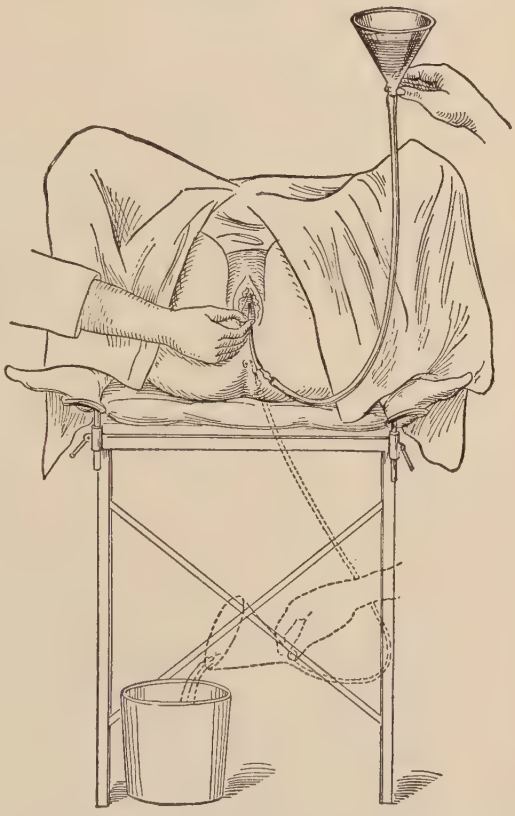

Fig. 19.—Irrigation of Bladder; Single Catheter. (After Morrow, "Diagnostic and Therapeutic Technic," published by W. B. Saunders Co., Philadelphia.)

The process is quite simple and takes about one-half an hour.

Jutte's duodenal tube should be introduced on an empty stomach, after which one-half a tumblerful of water is taken. With the patient on his right side the lower perforated end of the tube enters the duodenum within a few minutes. This is determined by aspirating the fluid which should be alkaline if from the duodenum. Subsequently the irrigating fluid is introduced.

Indications for Duodenal Lavage.—These are ulcer, cancer, dilatation and neurosis of stomach; jaundice, and other diseases of the liver; diabetes, pancreatitis, duodenitis, enterocolitis, typhoid fever, constipation;

for postoperative feeding; in cases of vomiting of pregnancy, and especially in auto-intoxication.

Advantages Claimed for Jutte's Apparatus.—1. Dr. Jutte's tube, being fitted with a stylet, can be manually introduced, like a stomach tube.

2. This is done in the doctor's office, immediately before use, as contrasted with from two to three hours required for other types.

3. Owing to the small size of the sinker, Dr. Jutte's tube slips into the bowel within a minute or two.

4. For this reason retention of the tube is unnecessary, as it can be introduced readily for each feeding.

5. Should by misadventure a particle of mucous membrane be drawn up, it is likely to be readily released, the perforations being in the soft rubber instead of the rigid part of the apparatus, as in other makes.

6. By means of the suction bottle and an ordinary large size syringe a pint or more of unadulterated duodenal juice can be collected within a short time.

7. Because of the shape of the sinker, no, or but very little, discomfort both during introduction and withdrawal is produced. (*See* Fig. 17.)

B. Irrigations

Irrigation of the Bladder.—Irrigation of the bladder is indicated in various inflammatory conditions of the bladder and preparatory to the use of the cystoscope.

It may be performed with a large-sized syringe provided with a soft rubber tip, or preferably by means of a single or double catheter. If no catheter is used the resistance of the sphincter must be overcome by gentle pressure. In using a catheter strict asepsis must be observed. A single catheter is connected with either a funnel or irrigator and the fluid is allowed to run in and out into a pail; this is repeated until the flow returns clear. A double catheter provides for continuous drainage, allowing the fluid to escape as fast as it runs in. If slight distention of the bladder is desired, the outflow tube should be closed with the finger for a few moments until the patient's attitude bespeaks discomfort. (*See* Fig. 18.)

The solution used must be sterile and at about the body temperature. The most frequently employed solutions are:

Boric acid	1%		
Silver nitrate	1:20,000	to	1:5,000
Bichlorid of mercury	1:5,000	to	1:20,000
Protargol	5:100	to	2:100
Permanganate of potash	1:5,000	to	1:1,000
Salt-solution	9:1,000		

(In the presence of tenacious pus, a stronger salt solution will be found very serviceable.)

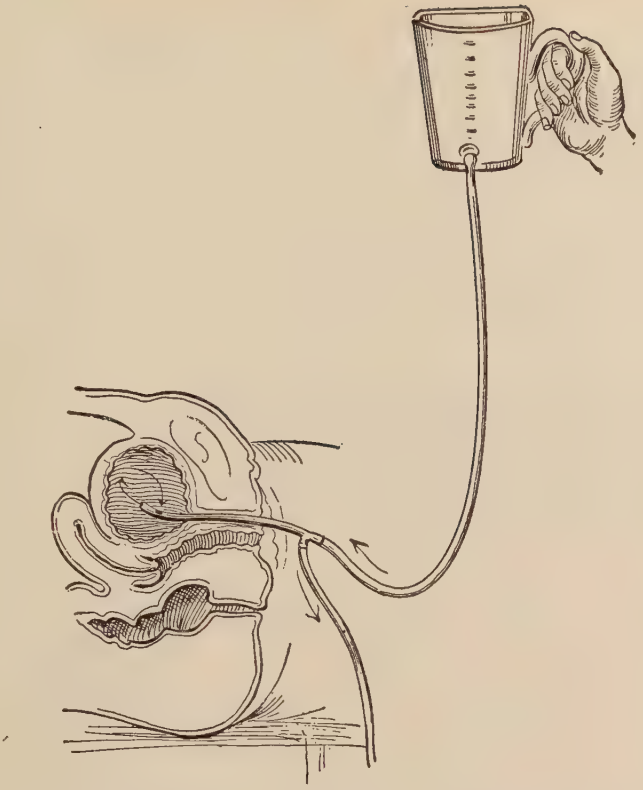

FIG. 20.—BLADDER IRRIGATION WITH DOUBLE-FLOW CATHETER. (After Morrow, "Diagnostic and Therapeutic Technic," published by W. B. Saunders Co., Philadelphia.)

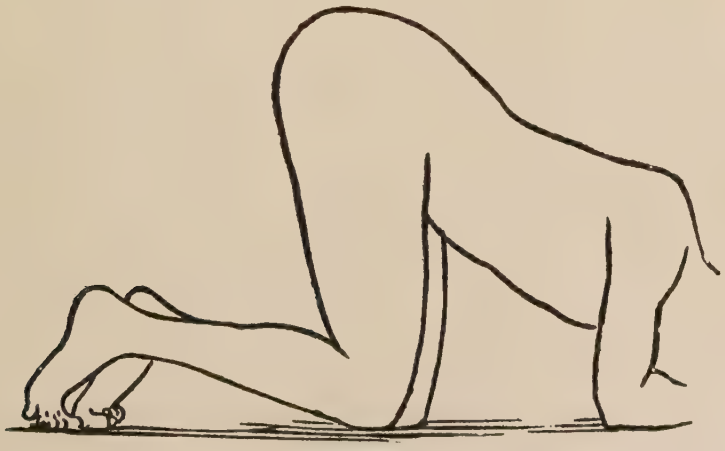

FIG. 21.—THE KNEE-CHEST POSITION. This position is recommended for giving a high enema.

Bowel Irrigations.—Bowel irrigations, high or low, either with cold or warm water, plain or with glycerin, soap or other fluids, are extensively given for constipation, invagination or ileus, to clean the bowel prior to rectal feeding, in auto-intoxication, typhoid fever, generally in catarrhal conditions of the large bowel, and to introduce water into the system after operations and in shock.

In uremia irrigation may be continued for twenty minutes at 110° F. by alternately raising and lowering the funnel or bag. In jaundice the temperature of the solution should be 60° or 110° F. and to reduce fever 60°, 70°, 80° or 90° F.

Apparatus.—For high irrigation in adults a soft rubber rectal tube

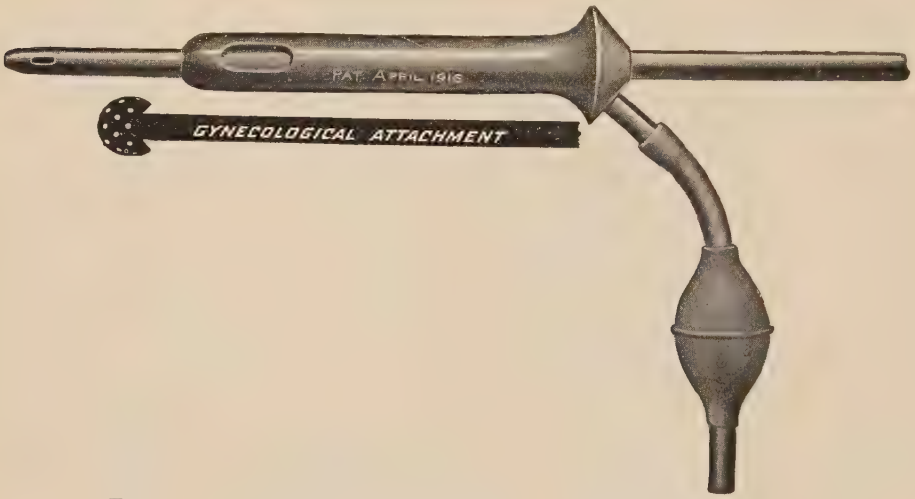

Fig. 22.—Colonic Irrigation Apparatus (A. R. Fisher, New York).

with one or two lateral and terminal openings and in children a rubber catheter connected with a fountain syringe or large funnel, is used.

Mode of Procedure.—With the patient preferably on the left side, or on the back or in the knee-chest position, the well-oiled tube is carefully introduced six inches or higher up into the rectum.

Low irrigations are given with a short, rubber tube and are ordinarily employed by the laity to procure bowel action.

To facilitate retention and the passage of the fluid upward the buttocks may be elevated.

Inflation of the Colon.—Inflation of the colon with water, oil or air is practiced to determine the relative position of a tumor. An enlarged spleen will be found in front of the inflated gut and a tumor of the kidney or retroperitoneal glands behind the inflated gut.

Mode of Procedure.—Air is injected through a rectal tube by means of a Davidson syringe or an inverted syphon of carbonated water.

Inflation of the Lower Bowel.—Inflation of the lower bowel with bismuth and oil is practiced in x-ray investigations.

After severe hemorrhage from the bowel, copious bowel irrigations are contra-indicated, as they are apt to induce renewed bleeding. If in a case of this nature the natural bowel action is delayed for several days, it is well to inject four to eight ounces of sweet oil into the lower bowel at night and give a small soapsuds enema of four to eight ounces the following morning.

Irrigation of the Vagina and Uterus.—Irrigation of the vagina is widely employed by the patients themselves as well as given by the physicians, after labor, for subinvolution and to control uterine hemorrhage.

Mode of Procedure.—In the latter conditions the strictest asepsis is essential; the apparatus, and especially the nozzle, should be boiled for several minutes. The nozzle should be of glass with a number of holes on the sides of the distal end. The thermometer should be sterilized in a solution of bichlorid of mercury.

The patient is placed in the dorsal position, with her buttocks on a douche pan and her knees pulled up and parted. The external genitals are cleansed with warm water or an antiseptic solution, and the labia being held apart, the muzzle is introduced with the operator's hands sterilized. The container should be elevated about two or three feet.

The solution is usually given at a temperature of 100° to 105° F., except in hemorrhage, when the temperature may be raised to 115° or 120° F.

From two to four quarts are ordinarily used, and among the many solutions the following are perhaps the most employed: lysol, ½ to 1 per cent; bichlorid of mercury, 1:5,000; permanganate of potash, 1:1,000 or to 1:5,000; alum acetate, 1 dram to 1 quart; salt solution, 2 drams to 1 quart of plain sterile water.

Irrigation of Ear.—Irrigation of the ear is employed for removing purulent material, wax or foreign bodies from the external canal. The syringe should hold from one to five ounces and be provided with a blunt, conical nozzle.

Among the solutions most frequently employed are: boric acid, saturated solution; bichlorid of mercury, 1:5,000; normal salt solution, one dram to a pint of boiled water. They should be warm.

Mode of Procedure.—With the patient holding a pus basin against his neck and with the light directed into the ear, the operator holds the auricle upward and backward and under gentle pressure directs the stream along the upper wall, taking care not to obstruct the meatus. For the complete removal of cerumen several sessions may be necessary; force should never be used.

Irrigation of the Nose.—This is employed for the purpose of cleansing the nose of crusts and secretions. It should always be done gently.

There are several makes of good nasal douches on the market which may be obtained at any drug store. For using larger quantities an irrigator or douche bag, fitted with a nasal nozzle, and holding about a pint of fluid, will serve well.

The solutions should be alkaline and warm. Any of the many alkaline proprietary preparations, such as Dobell's Solution, listerin, borolyptol, alkalol, glycothymolin or salt solution (1 dram to 1 pint), liquor antisepticus alkalinus, potassium permanganate, 1:5,000 to 1:500, will be found useful.

Fig. 23.—Hard-rubber Ear Syringe. (After Dench, "Diseases of the Ear.")

Mode of Procedure.—The container should be held just a little above the level of the nostril and the fluid allowed to escape either backward into the mouth or through either nostril, instead of being blown out forcibly—because of danger of infecting the eustachian tubes.

The Nasopharyngeal Toilet

(*Author's Method*)

The nasopharyngeal toilet, as advised by the author in all febrile diseases, consists in the instillation into each nostril, by means of an ordinary teaspoon, of a spoonful of weak salt water morning and evening (at bedtime and on rising) as the children lie on their backs with the nose tilted up and the mouth open. The liquid does not wash through at once; some of it remains in the various recesses of the nasal cavity and is eventually sneezed out or swallowed. In this way putrid matter and bacteria are washed away.

This form of mechanical cleansing is indicated as follows: It is the best method of local treatment of all cases of diphtheria, in which instances it should be resorted to every two hours; moreover, it is the most satisfactory local routine treatment in all diseases in which diphtheria frequently sets in as a complication, e. g., in measles, scarlatina, and pertussis; furthermore, it is a necessity before and after amygdalotomy and all operations on the nose and throat. This method is far superior to gargling, and the writer, after an experience of more than thirty years with this method, again takes pleasure in recommending it on account of its great value and harmlessness. In many forms of reflex cough, also in pneumonia and tuberculosis, it is far superior to nauseating expectorant mixtures, and in all forms of febrile disease in which the nasal secretion becomes dry, crusty, or hardened, one-half a teaspoonful of salt water instilled into each nostril affords much relief.

The nasopharyngeal toilet not only does not provoke middle ear and sinus complications, but, according to the experiences of the writer, apparently prevents them. If chemical antisepsis is in addition urgently demanded, as in malignant sore throat, we may employ a 5 per cent solution of ichthyol in water or a bichlorid of mercury spray, 1:10,000. The surface of the nose may be covered with vaselin, and an albolene spray may be used to advantage in some cases when the watery fluid is not soothing enough.

The Murphy Drip

This is a method of introducing water into the system when other more convenient methods are unavailable—for instance, after operations to quench thirst, etc. It is simple and safe and the water is quite certain to be absorbed.

Mode of Procedure.—A fountain bag, partly filled with water or saline, and supplied with a rectal tip, is suspended by the side of and two or three feet above the patient. By means of an artery clamp applied to the tubing the flow is so regulated that the water trickles down drop by drop. Then the rectal tip is introduced and secured to the bedclothes with a safety pin or to the legs with adhesive plaster. For children this method is not practicable.

The Murphy drip can be used with the duodenal tube to furnish fluid for the upper intestine, drop for drop. The following substances may be given by the drip method:

Plain tap water, normal saline solution, glucose 5 per cent, Ringer's solution one tablet to 250 cubic centimeters, bicarbonate of soda, coffee and digalen. The following combinations may also be employed.

Saline solution	500 c.c.	Saline solution	250 c.c.
Glucose	5 gm.	Coffee	60 c.c.
Whiskey	30 c.c.	Glucose	50 c.c.
Strychnine	0.0030 gm.	One egg.	

Glucose one tablespoonful to one quart of water, also the ordinary stimulants in saline solution.

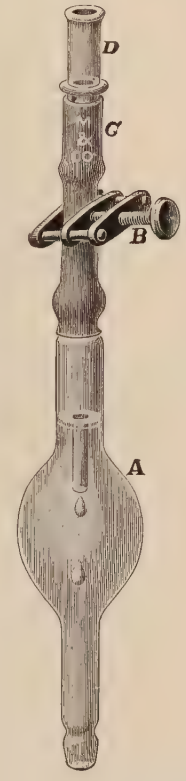

FIG. 24.—MURPHY DRIP TUBE. (Courtesy of Meinecke & Co., New York.)

Inhalations

Method of Procedure.—The simplest way to apply the soothing effect of ethereal oils, vapors or sprays upon the mucous membrane is to add to boiling water

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in an open vessel or croup kettle any of the well-known antiseptic and balsamic inhalants, such as oil of pine, oil of turpentine, oil of eucalyptus, compound tincture of benzoin, creosote, menthol, thymol, etc.

Another simple way is to drop a few drops of oil of turpentine or oil of pine upon filter paper and place it on the patient's pillow, or the substance to be inhaled may be sprinkled upon several layers of flannel, wrung out of hot water and held directly over the face.

For direct inhalation through the nostrils we make use of a wide-mouthed bottle filled with absorbent cotton and saturated with the drug to be used.

Inhalants.—Benzoinated Albolene.—For inflamed and swollen surfaces of the upper respiratory tract, benzoinated albolene, etc., may be applied by means of an ordinary atomizer.

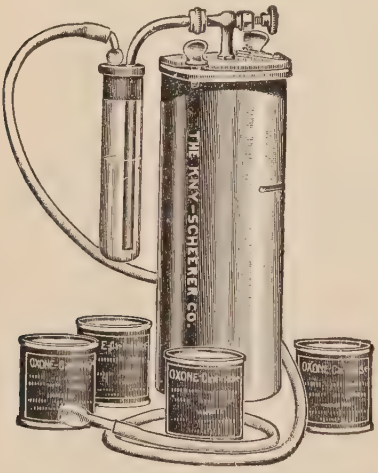


Fig. 25.—Oxone Generator, Portable Outfit.

Oxygen.—The inhalation of oxygen is not of much value except where its constitutional effect is desired, such as in collapse, shock, heart failure and in asthma and croupous pneumonia. Compressed oxygen is furnished in large tanks and is obtainable in most drug stores. The gas passes through a wash bottle into a funnel which is held over the patient's mouth. The accompanying illustration shows a portable apparatus, recently put upon the market, in which the gas is developed from chemicals supplied in tin cans.

Cigarettes or Smoke Asthma Powders.—In asthma the smoking of specially prepared cigarettes or the inhalation of smoke from asthma powders is quite popular.

A good recipe for the latter is:

Pulv. stramonii fol.
Pot. nitrat.....āā ʒi 30,0

S: A teaspoonful to be ignited on a porcelain plate several times a day.

Ozone inhalations are useful in all forms of anemia, primary or secondary; also in whooping-cough and in cases of pulmonary tuberculosis not too far advanced. Its employment is made difficult because of the lack of an efficient small portable ozone generator.

Artificial Respiration

Artificial respiration is indicated in collapse, both in *syncope* from circulatory failure and in *asphyxia* from respiratory failure, and is employed in connection with *tongue traction, forcible dilatation of the sphincter ani, kneading of the heart region* from below the ribs, sharp rapping of the *precordial area* with the edges of both hands, sharp percussion of the *seventh cervical vertebra,* and lowering the head and elevating the buttocks. Insufflation of oxygen, in asphyxia of the newborn, expansion of the lung tissue by forcibly breathing into the mouth or by pumping air with bellows and catheter into the trachea, is frequently practiced.

Mode of Procedure.—Artificial respiration is performed as follows: The patient is placed flat on the ground or on an inclined surface with the head lowered. For inspiration, the operator, standing or kneeling at the patient's head, firmly grasps the arms at the elbows and brings them upward and outward over the head into a perpendicular position. This position is maintained a few seconds; for expiration the procedure is reversed. The arms are brought downward and forward with firm and steady pressure upon the ribs, while at the same time, if an assistant is available, pressure is made from below the diaphragm. The procedure should be performed fifteen to twenty times a minute, and may be continued for an hour or more if necessary.

Tongue traction in asphyxia is an auxiliary method of artificial respiration. The tongue may be pulled forward with fingers or forceps and rhythmically brought out and in.

If difficult to get at, it may be secured by hooking the index finger behind the root of the tongue and bringing it forward in that way.

The Pulmotor.—To overcome asphyxia, an apparatus called the pulmotor has been devised; it is powerful in its action and must be used with extreme caution and good judgment.

Stimulation

Stimulation calls for much circumspection and good judgment on the part of the clinician and implies an exact recognition of the status of the disease. The difficulty in formulating the indications for stimulation is increased by the fact that the causes of circulatory failure are not yet clearly understood.

As a rule, stimulation should be resorted to when there are signs of impending circulatory failure, i. e., when the pulse becomes weak and compressible—but one should not wait until the pulse has become inter-

mittent. Children as a rule do not require as early stimulation as adults because of the greater reserve power of the youthful heart.

Drug Stimulation per Os.—Strychnia.—In general practice strychnia takes the first place as a stimulant, although its value is doubted by many good observers. The average dose is 1/50 to 1/30 grain, three times a day or more frequently.

Digitalis.—Digitalis is given in many forms: powder gr. i to iii; tincture mm. x to xxx; fluid extract mm. i to iii; infusion oz. ½ three times a day.

Digipuratum.—Of the newer digitalis preparations, digipuratum is most reliable as regards dosage and action. It comes in tablets, solution or ampules, each tablet or each c.c. representing one and one-half grain of the fresh drug.

Nitroglycerin.—Grain 1/100 to 1/50 every three hours.

Caffein and Sodium Benzoate.—Grains iii, every three hours.

Atropin.—Grains 1/150 to 1/100, especially when the heart is considerably slowed.

Camphor—Pulvis Digitalis—Acid Benzoic.—A combination of camphor, pulvis digitalis and acid benzoic āā grains, i to iii, every 4 hours, in sweetmeats or sweet chocolate, is excellent, if the stomach permits.

These drugs may be used alternately in serious cases, per os or hypodermically.

Temporary Stimulation.—Temporary stimulation may often be accomplished by hot, strong coffee, tea or beef tea. Of the simpler stimulants, spirits of ether, compound, gtt. 5 to 20 on sugar; and spirits of aromatic ammonia, gtt. 5 to 30, in sugar water, are very often used.

Alcoholic Stimulation.—In certain diseases, especially in septic fevers and in collapse, alcohol (brandy, whisky, champagne) is a valuable stimulant, but it should not be given promiscuously. The physician should ever remember the fact that many a person who never cared for alcohol has acquired the taste for drink on the sick bed.

Of alcoholic drinks those containing the least percentage of alcohol are best for convalescents—beer, ale, porter, barley wine, contain from 3 to 8 per cent of alcohol. Rhine and Moselle wines contain from 9 to 12 per cent; red wines from 9 to 10 per cent; champagnes and heavy wines from 12 to 14 per cent; whisky and brandy from 40 to 50 per cent of alcohol.

Stimulation by Hypodermic Injection.—This is far quicker and surer than that by mouth. The skin after cleansing it with soap, water and alcohol is grasped between two fingers and pulled, and the solution is injected under the skin or into a heavy muscle from a hypodermic syringe which has previously been boiled in water. Care must be taken to avoid nerves and large blood vessels. The water used for the solution must be boiled before dissolving in it the hypodermic tablets commonly used.

In recent years aseptic glass ampules containing drugs and stimulants ready for injection have been placed upon the market by a number of firms.

Drugs Used.—The drugs most frequently used for hypodermic stimulation are:

Strychnin	gr. 1/50-1/20	0,001-0,003
Atropin sulphate	gr. 1/100	0,0006
Nitroglycerin	gr. 1/100	0,0006
Caffein sod. benzoate	gr. ½-3	0,03-0,2
Camphor (20%) in olive oil		gtt. x-xxx
Digipuratum in ampules	gr. 1½	0,1

According to the requirements of the case they are used either alone or in combination or alternately, from two to three times a day, or every hour or two, or still oftener.

Pituitrin and Digitalis.—Pituitrin in solution in doses of 1,0 has been used hypodermically as an emergency measure in cardiac insufficiency and followed up by digitalis medication with happy results, as reported by E. Zueblin.[1]

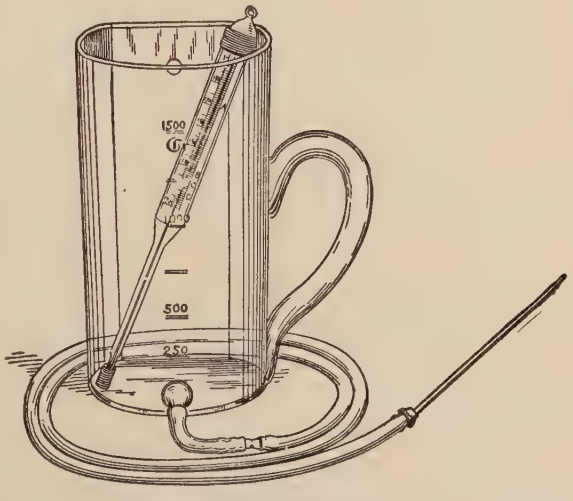


Fig. 26.—Apparatus for Hypodermoclysis. (After Morrow, "Diagnostic and Therapeutic Technic," published by W. B. Saunders Co., Philadelphia.)

Stimulation by Enteroclysis.—Slow instillation into the bowel of a normal saline solution, 2 drams to 1 quart, at 110° F., by means of a soft rectal tube and a fountain syringe or irrigator is a valuable stimulating procedure. From one to four pints of liquid should be allowed to run in. In urgent cases whisky may be added to the water (1 to 2 drams).

In cases with feeble heart action no possible harm can be done by this method, for the absorption of fluid will be in accordance with what the system may require.

Stimulation by Hypodermoclysis.—This procedure consists in the injection of one to two pints of sterile normal saline solution (sod. chlor.

[1] Zueblin, *Boston Med. and Surg. Jour.*, Dec. 24, 1914.

3ii to one quart of water) at a temperature of 115° F., into the areolar tissue—preferably the external portions of the thighs or the anterior of the abdominal wall or under the breasts in the female.

Under aseptic precautions a large hypodermic needle, three to four inches long and connected with an irrigator, is pushed through the skin which is lifted up. The procedure is not very painful and is often very effective. In children one-quarter of the above quantities of fluid will suffice.

Stimulation by Venous Infusion.—In great loss of blood or rapidly failing circulation the injection under aseptic precautions of one to two pints of normal saline solution, at about 115° F., into, usually, one of the large veins near the elbow, is exceedingly efficacious. The skin is incised for about one inch, the vein exposed and two catgut ligatures are placed around the vein about an inch apart. The distal suture is tied. A small opening is made into the vein and the canula or a large hypodermic needle inserted through the opening, the proximal ligature being loosely tied around it to prevent leakage. The saline is then allowed to run in from a sterile container or funnel. When finished the canula is removed, the second ligature tied and the skin closed. Care must be taken that no air bubbles enter the blood stream, some saline being run through the canula before inserting it into the vein.

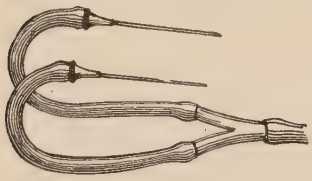


Fig. 27.—Double Needles for Hypodermoclysis. (After Morrow, "Diagnostic and Therapeutic Technic," published by W. B. Saunders Co., Philadelphia.)

Intravenous Infusion.—Locke's solution for intravenous infusion in hemorrhage has the following composition: 8 gm. sodium chlorid; 0,2 gm. each of calcium chlorid, potassium chlorid and sodium bicarbonate, with 1 gm. glucose and 1,000 c.c. distilled water, the whole oxygenated to saturation.

Anesthesia in General Practice

Anesthesia may be general, local or regional.

General Anesthesia.—General anesthesia, that is, the production of unconsciousness with loss of pain sensation, may be produced in a variety of ways. The anesthetics most commonly used are ether, chloroform, nitrous oxid, also ethyl chlorid and a very useful one—anesthol. Oxygen in combination with any of these will often be found advantageous.

General anesthesia should be preceded by a systematic preparation of the patient for the operation.

The patient's bowels should be opened by the administration of a cathartic the night previous to the operation, and no solid food should

be allowed for six to eight hours prior to it. He should void just before being taken to the operating room. False teeth and all unnecessary clothing should be removed.

The best position is the recumbent position. The nose, cheeks and lips should be protected from burns by applying a little vaselin, and the eyes had better be protected from the effect of irritating vapors by a towel. The anesthetizer should be prepared for stimulation and have ready for use such drugs as digitalis, strychnin, camphor in oil, whisky, besides a sterile hypodermic syringe, and possibly a tank of oxygen. Also a mouth gag, tongue forceps and gauze on a long holder with which to swab out the mouth, should be at hand.

In selecting an anesthetic, its safety for the individual patient should be the most important consideration. In order of safety, nitrous oxid stands first, then come ether, anesthol, ethyl chlorid and chloroform.

Nitrous Oxid.—Nitrous oxid produces anesthesia by preventing oxygenation of the blood. It is the safest of all anesthetics, especially when used with oxygen. Besides, the induction of anesthesia is the least unpleasant and takes place within a minute or two, and the patient comes out of the narcosis very quickly and without disagreeable effects from the anesthetic; nor are there any heart, lung, or kidney complications to be feared. In valvular heart disease nitrous oxid is contraindicated.

Unfortunately the absence of complete muscular relaxation, the comparative shortness of time during which the anesthesia may be maintained, makes the employment of nitrous oxid anesthesia unsuitable in many cases unless given in combination with oxygen.

It is given by means of any of the usual inhalers, such as Bennett's or Gwathmey's. These consist of a mask fitting the face and a rubber bag which is inflated with the gas from the tank or with admixture of oxygen.

For prolonged narcosis it is often advisable to give one-quarter grain of morphin hypodermically one-half to one hour before the operation.

Ether.—Ether is perhaps the most widely employed anesthetic of all, because of its comparative safety combined with complete relaxation and the possibility of prolonged employment. Very frequently it is preceded by nitrous oxid, anesthol, or ethyl chlorid anesthesia.

As its vapors are irritating to the mucous membranes it is sometimes contra-indicated in diseased conditions of the air passages, and also in advanced Bright's disease and high arterial tension with degenerative changes in the blood vessels.

It should be borne in mind that ether is highly inflammable.

The simplest and best method of administrating ether is by the drop method, using an ordinary mask, such as the Esmarch or Schimmelbusch mask, preferably covered with a piece of rubber cloth, having a central

hole through which the drops of ether are dropped fairly rapidly upon the gauze underneath.

Other methods consist in the employment of special inhalers, such as the Bennett Allis or Clover inhaler, or the Gwathmey vapor apparatus, or a cone may be improvised with a towel, placing near its apex a piece of gauze upon which the ether is poured.

Chloroform.—According to statistics, chloroform is the most dangerous of all the anesthetics, but it is very convenient, comparatively free from unpleasant after-effects, and frequently selected, in children, in the aged, in advanced renal disease, emphysema, bronchitis, and especially in puerperal cases, where a few drops used at the height of uterine contraction will take the edge off the pain.

The drop method, using the Esmarch, Schimmelbusch or any other mask, is commonly employed. A handkerchief or gauze spread loosely over the face will do in case of emergency. The drop rate is about six to ten drops in ten to fifteen seconds. There should be plenty of admixture of air.

Profound chloroform anesthesia is manifested by complete muscular relaxation, absence of reflexes and contraction of pupils. At this point the anesthetic should be stopped for a few moments, and then a lesser amount be administered. Abrupt dilation of pupils and pallor are danger signs and call for temporary removal of the mask and, if pulse or respiration is abolished, for hypodermic stimulation, lowering of head and artificial respiration.

Anesthol.—Anesthol is a mixture of chloroform, ether and ethyl chlorid. It produces essentially a chloroform narcosis, but is much safer and much less abrupt in the onset of danger signs. The patient goes under the anesthetic quietly, and if carefully watched is easily controlled throughout and rarely suffers much from after-effects. It is often used to initiate ether narcosis. It should always be fresh, and is administered in the same manner as chloroform, but about twice as much of it is required.

The narcosis can be extended over hours.

Ethyl Chlorid.—Ethyl chlorid is chiefly employed for short narcosis, in children and as a preliminary to ether narcosis. It is dispensed in glass tubes provided with a spring stop-cork which permits of control of the amount used. It is given by means of a mask, which should be covered with oil silk or rubber cloth having a small central hole through which the ethyl chlorid is squirted onto the gauze underneath.

Local Anesthesia.—Local anesthesia may be produced by freezing the tissues with ethyl chlorid or by infiltrating them with weak anesthetic solutions. This latter method has in recent years been brought to such a point of perfection that even a number of major operations are not infrequently performed under local anesthesia.

Local anesthesia may be produced by freezing the tissue with ethyl

chlorid or by means of analgesics, by either paralyzing the sensory nerve endings through direct contact with the drug or by injecting it into or near the nerve trunk in some part of its course, thereby preventing the conduction of nerve impulses.

Freezing a part is accomplished by spraying ethyl chlorid upon it until it becomes blanched, holding the tube downward so that when the spring stop-cork is released a jet of fluid is emitted. Then the incision is made quickly before the tissues recover. This method is naturally applicable only for small operations.

Of the many drugs that are used for local anesthesia, cocain, alypin, novocain, beta-eucain, and tropococain are probably the most widely used. On account of the toxicity of *cocain* many operators prefer one of its substitutes.

Unless circulation in the part to be operated on is impeded by constriction it is not advisable to use more than about one and one-half grains of cocain at one time.

Cocain solution should be prepared with freshly boiled water, and its strength should vary according to the end in view.

For the skin and perineal injections a one-fifth per cent solution (1 grain of cocain to one ounce of water or physiological salt solution) is usually employed; *for intraneural injections* a one-half per cent solution, and *for deeper infiltration* a one-tenth per cent solution.

Applied to the unbroken skin cocain has no effect, but *mucous surfaces* may be spráyed or brushed over with a one to two per cent solution; or a bit of cotton dipped into the solution is placed in contact with the part for a minute or two. For the *urethra* 1 dram of a one per cent solution is injected by means of a syringe and left in place for two to five minutes. *For the eye* one to two drops of a two or four per cent solution are sufficient.

For anesthetizing the skin and subcutaneous tissues a sterilized thin hypodermic needle is thrust just under the skin, and a few drops are injected into this part; then the needle is pushed a little farther, and so on until enough tissue is treated. In this way multiple punctures are avoided and the process of injection is made almost painless. To avoid absorption it is well to obstruct circulation by placing a tight bandage or rubber band proximally to the part, if possible.

Schleich's Infiltration Method.—This consists in producing an artificial ischemia over a large area, by injecting a weak solution such as the following:

Cocain hydrochlorate	gr. 1½	0,09
Morphin sulfate.....	gr. ⅓	0,02
Sodium chlorid.....	gr. iii	0,2
Distilled water.....	℥iii ℥iii	100,0

The solution is injected into the skin at different points, and wheals of blanched tissue are formed. Then injections into the deeper layers are made until the whole area is thoroughly infiltrated.

Regional Anesthesia.—Regional anesthesia results from the application of anesthetizing agents to nerve trunks or the spinal cord and extends to the area supplied by the nerves affected.

Blocking of nerve impulses by injecting cocain or other drugs around

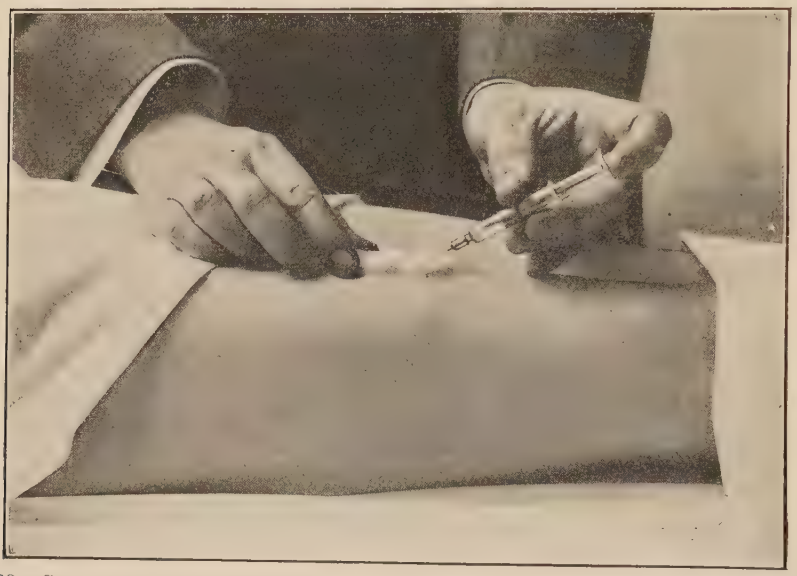


Fig. 28.—Second Step in Infiltration Anesthesia. The second and subsequent injections are made so that the edges of each infiltrated area slightly overlap. (After Campbell-Kerr, "Surgical Diseases of Children.")

the trunk (perineural) of, or directly into, the nerve (endoneural) makes it possible to do even major operations, such as hernia or amputation of the leg, under local anesthesia.

In the former case one-quarter to one-half dram of a one-fifth per cent of cocain is injected into the tissues surrounding the trunk of the nerve which supplies the region to be incised.

For endoneural injection the nerve should be exposed, and a few drops of a one-half per cent solution are then introduced into the nerve structure.

Spinal Anesthesia.—For spinal anesthesia the reader is referred to the article on Spinal Puncture (p. 75).

Tropacocain is the drug now most often used for spinal anesthesia. From one-half to one grain is injected in a five per cent solution. Stovain and novocain are also frequently employed in the same concentration, the dose of the former being three-quarters to one grain, and of the latter three-quarters to one and one-half grains.

Massage—Vibration—Hot Air Treatment

A. Massage

Massage is an art which involves considerable practice and skill to obtain the desired good results. In an emergency any adaptable person will be able to do the simpler manipulations with fair results, if a few simple suggestions are followed.

Mode of Procedure in Massage.—In the first place the skin of the patient and the hands of the operator must be lubricated with massage

Fig. 29.—Massage (Schwalbe).

cream, dusting powder, cocoa butter, or olive oil. The parts to be massaged are to be nude and relaxed. In abdominal massage the knees may be drawn up. In inflammatory conditions and pain, the movements should be away from the seat of trouble; while poor circulation calls for movements in the opposite direction.

Indications for Massage.—Massage is indicated for the removal of exudates and infiltrates, whether from trauma or as the result of chronic inflammation; it is indicated in atrophic conditions and contractions; in anemia and to enhance the secretory activity of glands and organs and to stimulate or increase general metabolism.

Contra-indications for Massage.—Massage is contra-indicated in abscesses, superficial and deep, and infections of the skin (erysipelas) on account of the danger of spreading the infection. Also in *acute* articular rheumatism, in phlebitis and after internal hemorrhages.

Very debilitated and neurotic patients should be massaged with the greatest gentleness. Letting the hands glide gently over the surfaces is soothing and beneficial; it is not the force exhibited that counts.

Forms of Massage.—The various forms of massage are stroking, kneading, friction, tapping, and vibration. They are given singly or in combination. The stroking movements are executed by letting the finger as far as possible encompass the muscles, stroking and pressing them and the surrounding tissues throughout their entire length.

In *kneading* the extremities or the back, both hands grasp the musculature and thus press and knead the masses against each other. In abdominal work the operator lets the superficial structures roll through his hands from the center towards both sides.

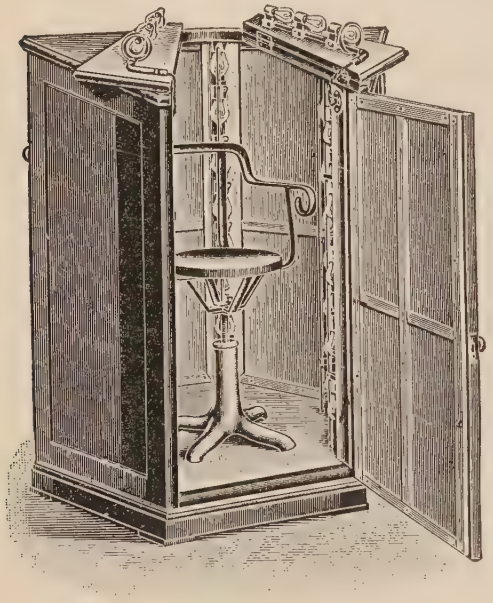


Fig. 30.—Hot-air Cabinet (electric-light).

Friction is chiefly employed in massaging joints and over small areas. The operator executes circular movements with the thumb and finger tips or with the palmar surface of one hand, while the other hand is engaged in making lateral frictional movements.

Tapping consists in a rapid chopping movement with the ulnar borders of both hands perpendicular to the direction of the muscles.

Massage as an Aid to the Circulation of Blood and Lymph. — Daily muscular contractions by means of exercise aid the circulation of the blood and lymph by causing a pressure on the arteries, veins, and lymph channels. The act of breathing also exerts a suction pump action on the circulation, drawing the blood toward the heart. Muscular contractions produce a pressure on the walls of the veins whereby the blood is forced toward the heart. It has been shown that *effleurage* stimulates the superficial muscles, produces dilatation of the superficial vessels and insensible perspiration, excites the skin reflexes, and, acting through the cutaneous nerves, increases the rapidity of the circulation and the heart beat. Massage stimulates the flow of lymph, increases the velocity of the blood current through the part operated upon, and temporarily decreases the size of a limb while increasing its muscular power.

With the aid of massage and movements, a better distribution of the blood is effected. Through this the nourishment of the whole body is improved. The heart also will thus receive its due nourishment, and retain

or regain its power to force the blood regularly to all parts. An irregular action of the heart may disappear, the blood will pass more easily and with less obstruction through the lungs, and respiration will become deeper and easier.

Treatment of Stiff Joints by Massage and Movements.—The greatest care is required in the treatment of joints, since it is quite possible to provoke fresh inflammatory action by rough handling. When massage is carried out without violence and with good judgment, *it gives better results*

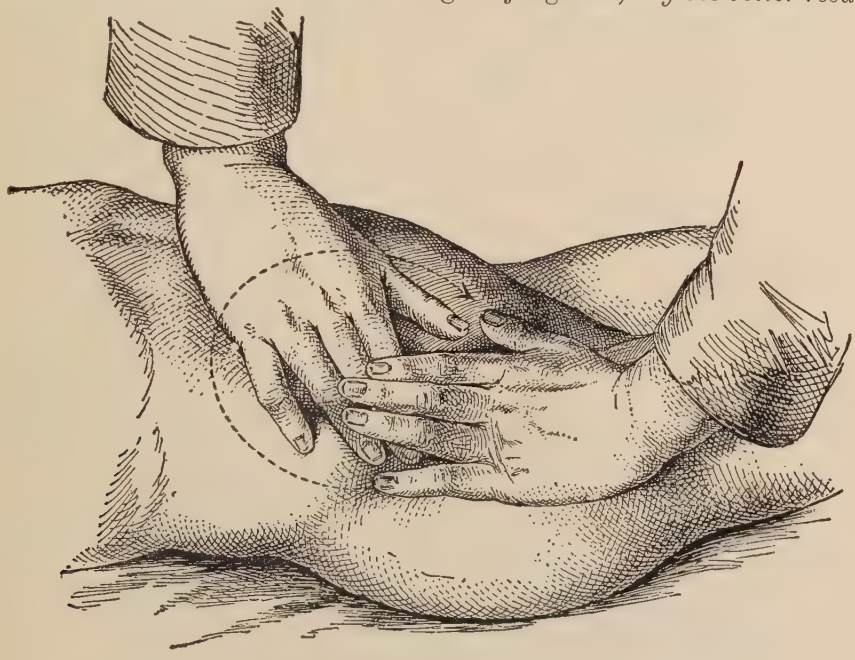


FIG. 31.—ABDOMINAL MASSAGE (Schwalbe).

than any other form of treatment. The pain and discoloration will in a very short time disappear, the tension diminishes as the products of inflammation are carried off, the fever temperature falls, the natural outlines reappear, extravasated blood is dispersed, and adhesions between the torn and bruised surfaces are effectually prevented.

Treatment of Sprains by Early Massage.—It is a well-known fact that massage is of the greatest value in both acute and chronic cases. The earlier the patient receives treatment the sooner will he enjoy its good effects. Immediately following the injury the parts are very tender; perhaps the whole limb is swollen, the joint distended with blood and very hot to the touch.

In a case of this nature the patient should be treated by gentle *effleurage* (slight stroking) performed with the palm of the hand and of from ten to fifteen minutes' duration.

As soon as the acute pain has disappeared, the masseur can apply friction manipulation, performed with the tips of his fingers to force away exudates. The masseur should begin at some distance from the affected part and work his way gradually to it. After a few treatments the joint becomes quite free and almost painless. The patient may then be allowed to use his limb, and if the pain does not return the exercises should be increased day by day. The limb should be bandaged, and a continuous hot application is serviceable. Provided there is no fracture, five to ten days of treatment will bring about a return to the normal condition of the parts.

Fig. 32.—Dry Hot-Air Treatment.

When manual treatment by massage and systematic movement are inadequate, we may call to our aid the various mechanical devices, such as the *pendulum apparatus* and the *vibratile.*

B. Vibration

Vibration is particularly stimulating to smooth muscle fibers (peristalsis) and is sedative to nerve endings. It is an oscillatory movement executed according to the part treated, with the palm of the hand, the tip of a

finger—as when treating the supra-orbital nerve—or by thumb and index finger for massage of the larynx.

Mechanical Vibration.—Mechanical vibration by means of the oscillating vibratory machine is an important aid in the treatment of many functional and organic derangements. It increases the flow of blood and lymph to and from a given area or organ, thereby stimulating secretion and excretion, encouraging muscular and general metabolism, and relieving tissue congestion, muscular rigidity, and pain. Like massage, it aids the general and local circulation and indirectly improves respiration, digestion, secretion, and excretion.

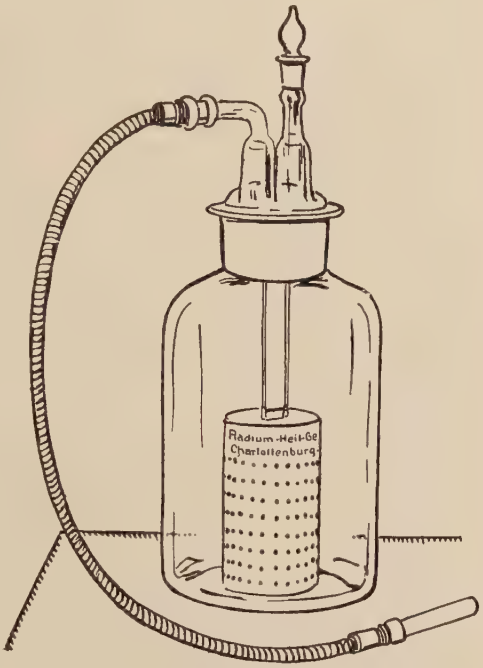


FIG. 33.—RADIUM INHALATION BOTTLE. (Courtesy of Radium Limited, New York.)

Vibratory treatment may be applied to any accessible tissue or organ, and is particularly useful in *chronic muscular rheumatism,* in gastric and intestinal indigestion, in constipation, in chronic Bright's disease, in sciatica, in lumbago, in sprains, in neuritis and neuralgia, in chorea, in goiter, in insomnia, in many pelvic and joint inflammations, and in paralyses.

Generally speaking, it has about the same indications as massage, and may be employed daily or every other day for fifteen to thirty minutes.

Remedial and Passive Movements

Remedial and passive movements for patients in bed or confined to the room in connection with massage and vibration are of very great value in many local or general ailments.

Wherever conditions are such that active exercise is indicated, but cannot be carried out by reason of cardiac weakness, passive exercises should be practiced also in functional disturbances in muscles and joints.

BREATHING EXERCISES.—Breathing exercises are indicated in the convalescent stages of pneumonia or pleurisy or following the operative removal of fluid within the thorax. In this class of cases the blowing of water from one bottle to another can be practiced daily.

C. Hot Air Treatment

By means of an ovenlike apparatus hot air at a temperature of 200° to 400° F. may be applied to almost any part of the body. This treatment is useful in all chronic inflammatory conditions, by facilitating the transfer of blood and lymph. It may be used in conjunction with massage and vibratory massage in chronic affections of the joints, particularly in chronic rheumatism, with and without plastic deposits, in gout after the acute stage is passed, and in all forms of neuralgia and neuritis from any cause whatsoever.

The patient, after being undressed and wrapped in blankets, has his arm, leg, or any convenient portion of his anatomy placed inside a specially constructed cylinder which is heated to the required degree by gas, oil, or electricity. The exposure is continued from one-half to three-quarters of an hour. This causes profuse perspiration and elevates the bodily temperature one or two degrees.

Radium Therapy

The therapeutic value of radium depends upon its so-called *radio-activity,* which is defined as "the property of spontaneously emitting radiation, capable of passing through metal and substances opaque to light and having the power of discharging electrified bodies."

The radio-active value of a radium salt is determined by observing the rate of movements of a gold leaf electroscope.

Quantities and emanations of radium are expressed in terms of *curies, microcuries* and *Maché units.*

Radium rays are named alpha, beta and gamma, which differ in velocity and power of penetration.

Radium salts in aqueous solution constantly give off radium emanation.

One microcurie is the amount of emanation of 1/1,000 of a milligram of radium and the equivalent of 2,500 *Maché units.*

Value of Radium.—It is claimed the chief value of radium is in the relief of pain in the acute, subacute and chronic forms of arthritis (rheumatics or infectious), in gout and divers neuralgias, and that new growths are favorably influenced principally by virtue of beta and gamma rays.

Administration of Radium.[1]—The radium salts and the emanation can be placed in any sealed container, but preferably in glass.

Dosage.—It may be administered as baths, by subcutaneous injection in the neighborhood of an involved joint (0.25 to 0.5 microcurie in 1 or 2 c.c. distilled water), by local application as compresses (5-10 microcuries), by mouth as a drink cure (in increasing doses of from 1-10 to 10

[1] *Jour. Amer. Med. Assn.*, Vol. LXII, No. 1.

microcuries three or more times a day), by inhalation, the patient for two hours daily remaining in the emanatorium, which contains 0.0025 to 0.25 (average 0.1) microcurie per liter of air.

The market supply is:

Radium chlorid
Radium sulphate } IN COMBINATION WITH A BARIUM SALT
Radium bromid

Radium Emanation Activators

Activators can be had in any desired strength from 5,000 to 1,000,000 microcuries or even higher, and a guarantee of the exact strength always accompanies each apparatus.

Doses should be withdrawn from the Saubermann Radium Emanation Activator *every three hours,* because the life of emanation in the human body only endures for that length of time, and perfect results are only obtainable by keeping the system thoroughly and constantly saturated.

FIG. 34–35.—RADIUM EMANATOR. (Courtesy of Radium Limited, New York.)

General Directions for Use of Field Activator (for patients who are away from home during the day or who are traveling about).—The entire quantity of water contained in the field bottle should be taken in five or six doses daily—one after each meal and one in the middle of both morning and afternoon. When taken between meals the dose should follow the eating of a cracker or something of a similar nature.

FIG. 36–37.—RADIUM WATER. (Courtesy of Radium Limited, New York.)

The amount withdrawn each time should be about equal; this can be regulated after one or two days' use.

The large cap on the top of the bottle is designed for use as a cup or measure of the dosage.

The water should be taken as soon as it is withdrawn from the field bottle.

The water used to refill the bottle, if city water, should be thoroughly boiled, and then allowed to become quite cool before it is introduced into the apparatus. Spring or distilled water may also be used.

The bottle should be refilled each night after the last dose has been withdrawn, so as to be ready for use in the morning. The bottle can be carried in a coat pocket.

Duodenal Intubation and Aspiration

Considerable interest has been devoted during recent years to the study of the contents of the duodenum and the changes which it is found to undergo as result of disturbances in the functions of various organs of the digestive tract, particularly the pancreas, liver and gall bladder.

Progress in the study of this subject has necessarily largely depended upon the means a hand for obtaining the contents of the duodenum, so that at the present time, with various instruments available for obtaining the material desired, examination of duodenal contents is becoming a matter of routine to the gastroenterologist.

An instrument widely used is known as the duodenal tube or pump. Essentially it consists of an aspirating syringe to which is attached a long rubber tube with a perforated metal capsule at its end. The tube is marked off at various intervals to indicate the distance to which it has traveled in the alimentary canal. In the Meltzer-Lyon method of aspiration a simple Rehfuss tube is used.

In the introduction of the tube the patient is instructed to swallow the metal capsule together with the lower end of the rubber tube after they have been moistened with warm water and placed into the patient's pharynx. The passage of the tube through the esophagus is facilitated by having the patient drink some water and on reaching the stomach it is passed through the pylorus and into the duodenum by the peristaltic action of the stomach. The tube is allowed to remain in the duodenum for about one hour after which an attempt is made to aspirate for its contents. In the Meltzer-Lyon method after the tube has reached the duodenum 50 c.c. of warm sterile magnesium sulphate solution is slowly injected. This causes a relaxation of the duodenal sphincter of the common duct aiding the flow of bile and pancreatic juice.

The patient should be instructed to take only fluid food on the day of examination, such as beef bouillon, sweetened tea without milk, etc.

The appearance and constituents of the duodenal contents varies according to the condition of the various organs which empty into the duodenum. Analysis of the material obtained should consist of both qualitative and quantitative tests of the pancreatic ferments, e. g., trypsin, steapsin and amylopsin, as well as the rennet ferment which the pancreatic secretion is believed to contain. Examination should also be made for the presence or absence of bile and its condition. Determination of the presence of blood and gastric juice is also of diagnostic importance.

For the various laboratory tests of the substances mentioned the reader is referred to any standard manual on laboratory technic.

The conditions which are aided in their diagnoses by analysis of the duodenal contents are mainly as follows: organic and spasmodic stenosis of the pylorus, gastric and duodenal ulcer, acute and chronic duodenitis, acute and chronic pancreatitis cancer of the pancreas, biliary obstruction, catarrhal and hemolytic jaundice cholecystitis, cholelithiasis and echinococcus of the liver.

The instrument used in duodenal intubation with slight modification can also be used for the purpose of introducing food into the duodenum. This procedure is known as duodenal alimentation and can be employed to advantage in a variety of conditions where it seems advisable to suspend the gastric function temporarily.

Radiant Light and Heat

Of the various apparatus for the production of radiant light and heat the incandescent light and the Tungsten lamp with from 50 to 500 candle power bulbs and the light bath cabinets are not infrequently seen in the practitioner's office. They may be employed in connection with electricity, or alone for general tonic effects, increase of metabolism and nutrition and to produce hyperemia and stimulate phagocytosis in infections; they have been found effective in the treatment of skin diseases such as eczema, psoriasis, erysipelas.

A new light treatment has recently been added by the invention of the Alpine Sun Lamp (the Nagelschmidt-Bach modification of the Finsen lamp).

It produces ultraviolet rays of great intensity. Besides taking the place of Alpine resort and the Finsen light treatments, it is being

Fig. 38.—Alpine Sun Lamp.

successfully used in surgery and general medicine to stimulate granulation of slowly healing wounds and ulcers; to increase the metabolic functions in tuberculosis, high blood pressure in neuritis, alopecia areata, in which it appears to produce striking results. The effects which are chiefly due to circulatory stimulation are not confined to the surface, but are observed in deep-seated affections.

Catheterization and Aspiration of the Bladder in the Male, Female and Child

A. Catheterization

Indications for Catheterization.—Catheterization of the bladder is indicated when there is an obstruction to the flow of urine from stricture and hypertrophy or congestion of the prostate; also when hot applications or sitzbaths are ineffective in relaxing the spasm of the compressor muscle caused by irritation of a calculus or other foreign body, or due to shock and nervous affections. Dribbling of urine or "false incontinence" may be the patient's only complaint, but on examination a doughy mass will be palpable over the pubis.

Catheterization in the Male

To catheterize the bladder, one or more of several kinds of catheters should be at hand. The following are among the best: *for simple retention* of urine a soft rubber Nelaton catheter or a silver catheter with a short curve.

For enlarged prostate a semi-rigid Mercier catheter, having a slight bend at the tip, is used. This facilitates overriding the obstruction.

For stricture a gum elastic olivary catheter and several Fouley's tunneled catheters and filiforms or a long curved silver catheter is best.

Mode of Procedure.—The instruments and the operator's hands must be thoroughly sterilized and the glans penis should be cleansed and wiped off with bichlorid solution. The catheters should be lubricated with some sterile medium.

The patient is placed on his back with the buttocks slightly elevated and a pus basin between his thighs to receive the urine. If a soft rubber catheter is used, the operator, standing on the patient's left side, holds the penis straight up and slowly strips it over the catheter which is gently pushed forward until the bladder is reached, the resistance at the membranous part being overcome by *gentle* pressure.

In the manipulation of a semi-rigid or rigid catheter having a curve, great caution must be used not to create any false passages.

The first steps of the operation are those described above, but in order that the trip may follow the natural passage around the symphysis, it is

necessary to slowly swing the handle of the catheter upward and downward, till, when the bladder is reached, it comes to lie between the thighs. If this is done too soon, the tip presses against the symphysis.

The catheter is then retracted a little and again pushed forward with the gentlest of pressure, following somewhat more the posterior urethral wall. If it is here too arrested, it is again retracted a little and the tip gently pressed again to the upper urethral wall or it is directed manually

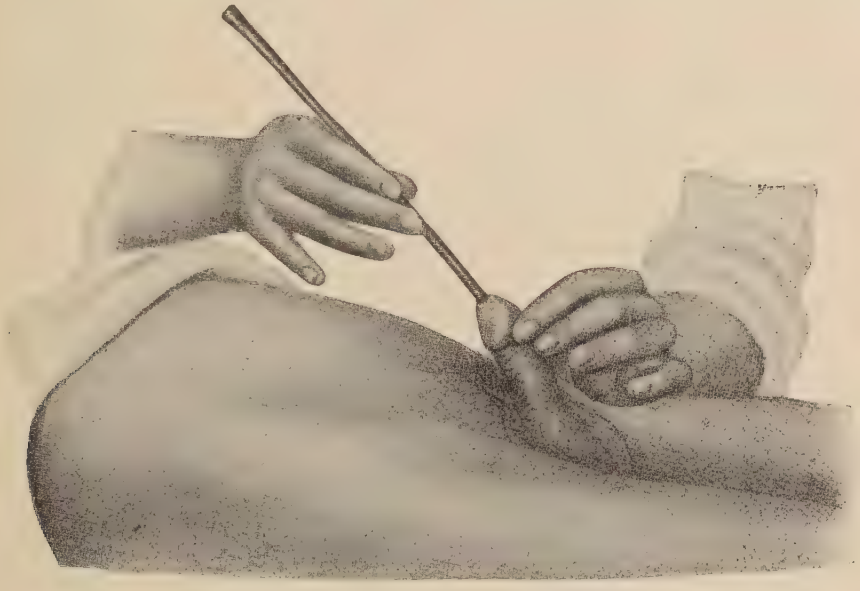


Fig. 39.—Catheterization (Schwalbe).

after introducing the index finger into the rectum. The catheter is removed with the same movements in reversed order.

In the presence of stricture a thin soft catheter, and failing in this, an olivary catheter, should be tried. If still unsuccessful a filiform may be used as a guide and over it is then slipped a Gouley tunneled catheter if possible, or a soft rubber catheter with the tip cut off and the end smoothed by holding it in a flame and rubbing the melted rubber off. If this cannot be done the filiform is left in place and the bladder will slowly empty itself by capillary drainage.

In prostatic hypertrophy a Mercier catheter will often overcome the obstruction, when a soft rubber catheter will not pass.

If the above procedures are unavailing, aspiration of the bladder should be performed.

Continuous Catheterization

The simplest way to establish permanent drainage is to introduce a well-lubricated soft rubber catheter in such a way that its end just projects

into the bladder. The catheter is then fastened to the penis by four long narrow strips of adhesive plaster, placed longitudinally. These are in turn secured by a broader strip almost, but not quite, encircling the penis. The open end of the catheter is connected with a drainage bottle, half filled with an antiseptic solution. The catheter may be left in place for a week or two.

Catheterization in the Female

Any straight or slightly bent, soft or rigid catheter may be employed.

The patient is in the dorsal position, with her knees raised and separated. The operator spreads the labia majora widely apart, cleanses the meatus with a mildly antiseptic solution, and under strictly aseptic precautions introduces the catheter, which, because of the shortness and straightness of the urethral canal, presents no difficulty.

Catheterization in the Child

In the child catheterization is also a simple matter. The procedure is the same as in the male and female respectively, except that a thin soft rubber catheter is the kind to use in practically all cases.

B. Aspiration

Aspiration of the Bladder

Suprapubic puncture is the best way of draining the bladder when catheterization is impossible.

A Potain aspirator or a trocar and cannula may be employed.

The pubis should be shaved, cleansed and sterilized; then a short skin incision may, or may not, be made in the median line about one-half an inch above the symphysis, under local anesthesia. In this place there is little danger of entering the peritoneal cavity. The needle is then plunged into the bladder through the tissues which are here from one and one-half to two and one-half inches thick. In using a trocar the convexity should be upward. The cannula may be left *in situ* until the inflammation has subsided sufficiently to permit catheterization. A sterile dressing should be applied over the puncture wound.

Punctures and Scarifications for Dropsy and Effusion

Puncture by means of a large aspirating needle or a trocar is a routine measure for the removal of accumulations of fluid in the cavities of the body.

Strictest asepsis is essential. Soap and water and alcohol for the

patient's skin and the operator's hands and boiling the instruments in water for five minutes are the preliminaries for puncture. The puncture site may be painted with tincture of iodin.

Ascites

With the patient on his back, fluid in the abdomen, if free, gives a dull percussion sound below the level of the fluid, which changes with change in the patient's position. By bimanual palpation one will appreciate a fluid wave when one side is lightly tapped. Above the level of the fluid there is no dullness on percussion, owing to the intestines floating on top.

FIG. 40.—HOW TO HOLD THE TROCAR. (After Hoxie, "Symptomatic and Regional Therapeutics.")

After emptying his bladder the patient is placed in a comfortable chair and a large-sized needle or a trocar is plunged in about the median line or to one side of the median line below the level of the fluid. Some prefer to make a small incision in the skin under local anesthesia before introducing the trocar.

FIG. 41.—AUTHOR'S TROCAR FOR WITHDRAWING ASCITIC FLUID.

Blocking up of the trocar by a loop of intestine may be prevented by the use of a trocar having a sievelike tip, as devised by the author.

Many quarts of fluid may be drained. If the patient feels faint, strong coffee or some whisky may be given, also the patient may be stimulated hypodermically, prior to the operation.

After dressing the wound, a tight binder should be applied.

Permanent drainage for ascites may lead to lasting improvement through the establishment of collateral circulation. A rubber catheter is introduced through a large trocar and left *in situ,* while the trocar is, of course, withdrawn. The end of the catheter is either clamped and the fluid is allowed to flow out occasionally, or it is connected with a suitable receptacle for continuous drainage. The process was first practiced by the writer and reported in the *New York Medical Journal,* February, 1886.

Hydrothorax—Pleuritic Effusion

When the pressure of fluid in the chest is sufficient to embarrass heart or lungs, or when the absorption of smaller quantities of serous fluid makes but little progress, aspiration may be performed under the strictest aseptic precautions.

The patient is placed astride a chair with his head bent forward and his arms resting on a pillow on the back of the chair. To separate the

Fig. 42.—Tapping the Abdomen under Local Anesthesia.

ribs as far as possible he bends a little over to the healthy side. With the skin and the instruments sterilized, the trocar or the needle of the Potain suction apparatus is pushed steadily through the chest wall near the upper margin of the rib at a place where there is dullness and absence of respiratory and voice sounds and diminished fremitus.

A sterile rubber tube may then be attached to the trocar, or, if the Potain apparatus is used, the tube will be attached to the needle. The fluid should be withdrawn slowly and the needle point should be kept away from the descending and approaching lung. All fluid need not necessarily be withdrawn, as absorption of any remaining fluid often takes place—more readily after puncture.

Stimulation with coffee or a little whisky may be necessary. If there

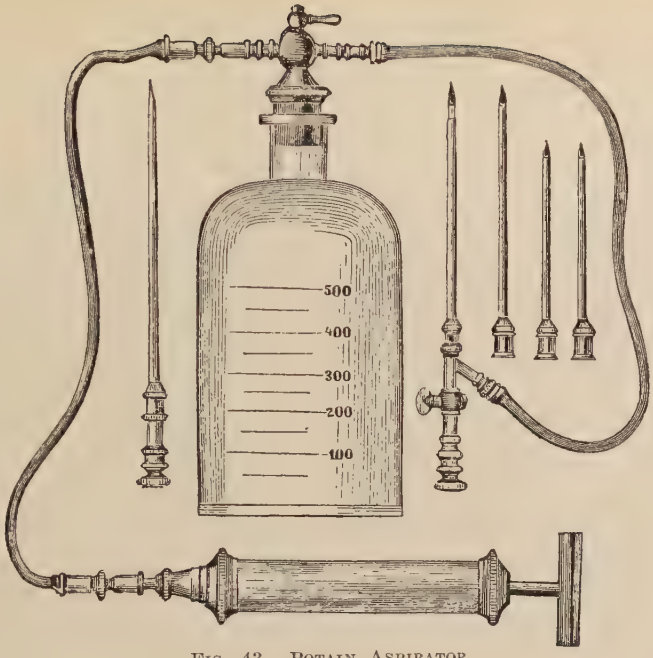


FIG. 43.—POTAIN ASPIRATOR.

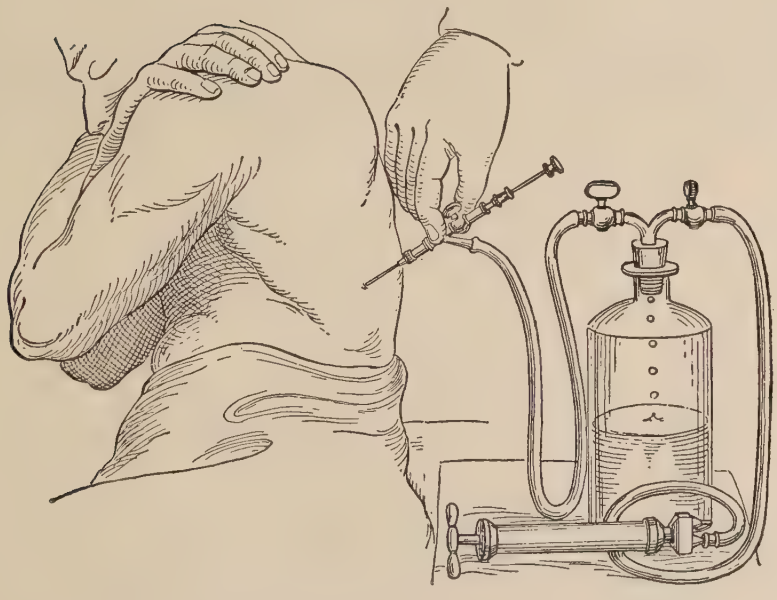


FIG. 44.—REMOVING FLUID FROM CHEST WITH POTAIN ASPIRATOR.

is no flow of fluid after puncture, as happens occasionally, the needle should be inserted deeper or withdrawn a little, or another puncture site may be selected. When through, the needle should be quickly withdrawn and the opening sealed up with sterile dressing or cotton and collodion.

FIG. 45.—EXPLORATORY PUNCTURE OF THE CHEST UNDER ETHYL CHLORID LOCAL ANESTHESIA.

Local anesthesia (ethyl chlorid spray or two per cent cocain solution) should be practiced if the patient is apprehensive as to pain.

Puncture for Hydrocephalus

In congenital cases which usually present a very thin skull cap, a thin trocar or aspirating needle is introduced under strict aseptic precautions at the anterior fontanelle, some distance from the median line so as to avoid the longitudinal sinus.

Not more than two to eight ounces of fluid should be removed, but the process may be repeated several times.

The scalp wound is dressed with sterile gauze and a tight bandage.

To reach the ventricles through the anterior fontanelle the trocar is inserted, as shown in the illustration. The introduction of a cannula to facilitate drainage of fluid into the *cisterna magma* has also been accomplished, but without noteworthy results.

Spinal Puncture

Spinal puncture is a measure now frequently used for securing spinal fluid, or for administering serum. It is performed for diagnostic purposes and for the purpose of relieving intracranial and intraspinous pressure in cerebrospinal meningitis, hydrocephalus, etc. It is also performed when spinal anesthesia is desired.

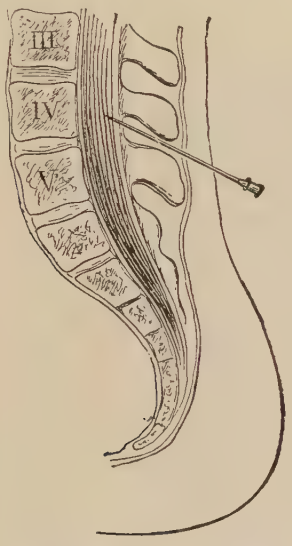


FIG. 46.—SPINAL PUNCTURE; NEEDLE IN SITU. (After Morrow, "Diagnostic and Therapeutic Technic," published by W. B. Saunders Co., Philadelphia.)

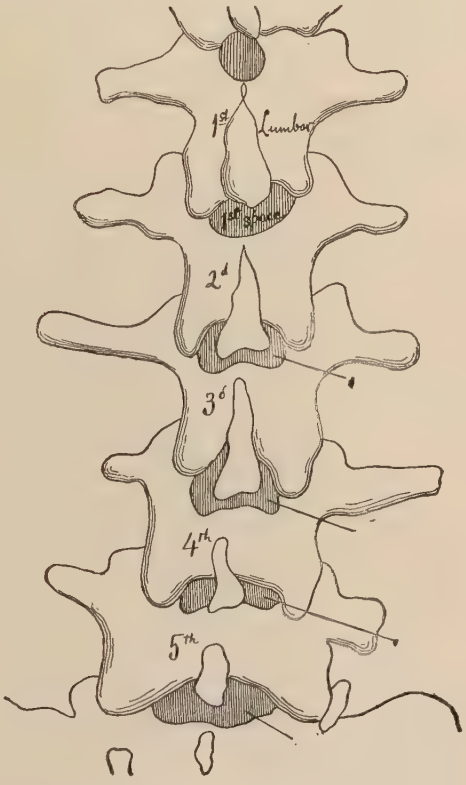


FIG. 47.—SPINAL PUNCTURE SITES. (After Hoxie, "Symptomatic and Regional Therapeutics.")

With the patient, preferably, in the sitting position, with trunk bent forward a little to one side in order to widen the intravertebral spaces, a thin trocar, about four inches long, is inserted under strictest asepsis and local anesthesia in the space between the third and fourth or fourth and fifth lumbar vertebrae, just below the level of the spinous process, and one-half to three-quarters of an inch from the median line, and in an upward and inward direction. If bone is encountered, the direction of the needle may be changed a little, when the spinal canal will be reached at a depth of about three inches in adults and one and one-half to two inches

in children. Upon withdrawing the needle of the trocar the fluid usually comes drop by drop and sometimes in a stream. For the relief of pressure from one to four ounces may be withdrawn.

The opening is then sealed up with cotton and collodion or adhesive plaster. Injections into the spinal canal, if such are contemplated, should be made after some of the fluid has escaped and before the trocar is withdrawn.

Puncture of Pericardium

Whenever the effusion in the pericardium is so massive as to interfere with the heart's action and thus threaten life, it should be removed—be it

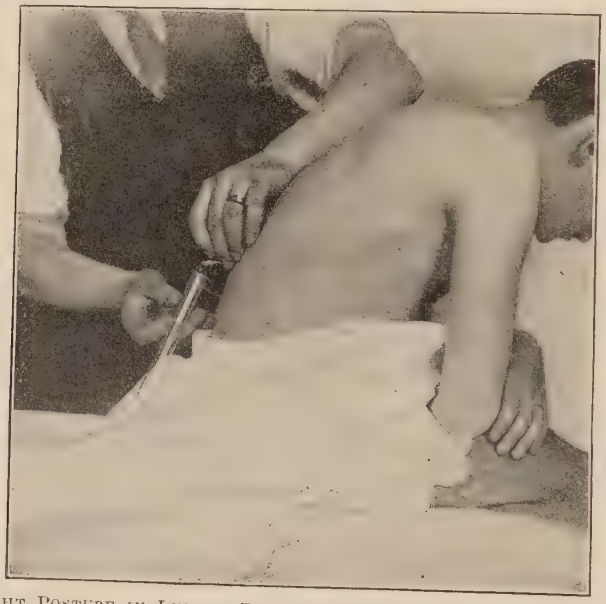


Fig. 48.—Upright Posture in Lumbar Puncture; Needle in Place and Fluid Flowing. (After Campbell-Kerr, "Surgical Diseases of Children.")

serum, blood or pus. The operation is performed under aseptic precautions with a trocar at the fifth interspace near the junction of the sixth rib with the cartilage, on the left side.

Puncture of the Scrotal Sac for Hydrocele and Puncture of a Joint for Hydarthros

This is performed with a trocar under aseptic precautions.

Scarification for Anasarca

When in the treatment of general dropsy, heart stimulants, hot air, catharsis, diuresis, dry diet, aspiration and venesection fail to bring about

relief, and bandaging, massage and elevation of the lower extremities does not reduce the pain and excessive tension of the parts, scarification may be resorted to. Scarification is a somewhat risky measure on account of the danger of infection.

After thoroughly cleansing the limb with soap, water and alcohol, a series of linear incisions running parallel to each other are made, or puncture may be performed with an aspirating needle. A dry, sterile gauze dressing, frequently renewed, will absorb the exuding fluid, or cupping glasses may be used to facilitate its removal.

Dry Cupping

Dry cupping is frequently indicated and resorted to in pain and for depleting deeper structures, especially in congestion of the lungs.

The inside of cell-shaped cups or of ordinary small teacups is swabbed with cotton moistened with alcohol, which is ignited and placed over the painful area and kept there for four or five minutes. Four to six may be applied at the same time and the process may be continued for twenty to thirty minutes.

Leeches

Leeches are another time-honored remedy and are useful for the relief of local congestion.

The part to be treated is bathed in ice water, slightly denuded of its superficial epithelium, and the leech is applied by gentle pressure. If it is desired to remove the leech before it drops off of its own accord, it should be swabbed with salt water. A leech will disgorge in plain water and may be kept in plain water for future use.

Poultices for the Relief of Pain

Poultices are readily prepared in the household with flaxseed meal, bran, hops, tea leaves and hot water.

Mud poultices are much employed in European spas.

Kaolin poultices, under various names, are very popular and can be obtained ready for use in drug stores.

The tins are placed into hot water, and the contents are thus heated up to poultice temperature. It can be spread on muslin with a knife.

Venesection—Blood Transfusion—Bier Hyperemia Treatment

A. Venesection

Venesection, though practiced little by the younger generation, remains a measure of great usefulness in eclampsia, uremia, pulmonary edema and in cardiac and respiratory embarrassment when the heart fails to react to drug stimulation. Nothing will unload the heart so effectually as venesection.

Method of Procedure.—It is done as follows: The arm having been thoroughly cleansed with soap, water and alcohol, a bandage is applied around the upper arm sufficiently tight to make the veins stand out plainly. Then under local anesthesia with one to two per cent cocain solution, the skin, preferably over the median basilic vein, is incised and a little opening is made into the vein with a snip of the scissors, or a large-sized aspirating needle is pushed through the skin into the distal end of the vein. From six to fifteen ounces of blood may be withdrawn. The wound is then closed by a firm bichlorid compress.

A bulging vein may be tapped by introducing a good-sized needle through the skin into the vein. If a rubber tube is attached to the needle and the distal end of the tube is connected with an aspirating or vacuum bottle the operation of venesection can be done without spilling a drop of blood.

B. Blood Transfusion

Simplified Method.—The technic used by Lewisohn is the following: Allow the blood of the donor to run through an ordinary cannula into a glass jar, containing 5 c.c. of 10 per cent sodium citrate solution. While the blood runs into the jar it is stirred with a glass rod to effect a good mixture of blood and citrate solution. The blood is then poured into an ordinary glass funnel, connected with the cannula or the patient, by a piece of rubber tubing. The whole procedure takes five minutes. From six to twenty ounces of blood can be instilled according to indications.

Other methods of transfusion as by the direct cannula and the syringe cannula methods are described in books on surgical technic.

In a report on blood transfusions as done at Mt. Sinai Hospital by Doctors R. Ottenberg and E. Libman, the following résumé is given:

Indications for Transfusion

1. Transfusion for Simple Hemorrhage.—(*a*) Gastric and duodenal ulcer; (*b*) dysentery; (*c*) typhoid hemorrhage; (*d*) ectopic pregnancy.

2. Transfusions in Connection with Surgical Operations.—(*a*)

Preliminary to operation; (*b*) for postoperative hemorrhage; (*c*) for shock.

3. Transfusions for the Cure of Hemorrhagic Conditions.—(*a*) Purpura hemorrhagica; (*b*) hemophilia; (*c*) hemorrhages secondary to: (1) blood diseases; (2) severe infectious disease; (3) jaundice (cholemia).

4. Transfusions for Blood Diseases.—(*a*) Pernicious anemia; (*b*) leukemia.

5. Transfusions for Infections.—(*a*) Infections with pyogenic organisms; (*b*) infective endocarditis.

6. Transfusions for Intoxications.—(*a*) Acute poisoning; (*b*) diabetic coma.

7. Transfusions for Debilitated Conditions.—(*a*) Cancer; (*b*) malnutrition; (*c*) simple anemia.

In the cases of hemorrhage from gastric or duodenal ulcer the results were exceedingly good; although all of the patients were in a desperate condition at the time of the transfusion, twelve of the fourteen recovered. In dysentery, on the other hand, the results were rather poor. In typhoid fever the results were exceedingly encouraging. Among seven transfusions, four were successful in relieving the immediate symptoms of hemorrhage. In the three cases of ectopic pregnancy, transfusion was life saving. Among the most satisfactory transfusions in the whole series were some done preliminary to operation in patients whose condition would otherwise have contra-indicated any other operation. There were twenty-three such pre-operative transfusions, and in thirteen of them the result was decisive and the patients recovered. In shock the results were very disappointing. We believe, however, that if shock could have been foreseen, so that the transfusion could have been done immediately instead of after several hours' delay in obtaining a donor, the results might have been better.

The best results in all the series of cases were those in the group of hemorrhagic conditions. Of the nine patients with purpura hemorrhagica, six recovered completely and one left the hospital improved. In five of the six cases of hemophilia treated, the hemorrhage stopped promptly, and the coagulating property of the blood became practically normal. We suggest as a prophylactic treatment for hemophilia that every individual known to have hemophilia ought to have at his command several persons whose blood, by previous tests, is known to be compatible with his own. Whenever serious hemorrhage occurs, prompt transfusion should be done.

In almost all of the thirty-five cases which had been transfused for hemorrhagic disease the serum treatment had been tried out thoroughly before the transfusion and had had no effect; we believe, however, that the serum treatment deserves a further trial.

In cholemic hemorrhage the results were rather disappointing; only one of the seven patients recovered.

In regard to pernicious anemia, and our study embraced twenty-four

cases, transfusion is the best remedy and, though it never cures, it leads to remission in about half the cases. If the first transfusion fails to bring about remission, one should be tried from a different donor. Splenectomy in pernicious anemia has about the same effect as transfusion. This should be reserved as a final method of producing remission when transfusion will no longer do so.

In myelogenous leukemia and acute lymphatic leukemia, transfusion was without effect, but in four of the five cases of chronic lymphatic leukemia, transfusion was followed by a remarkable remission in which the blood picture returned temporarily to the normal. The ultimate outcome of course was not affected. In bacterial infections, transfusion is of value only in so far as it restores the general resistance of the patient. In gas poisoning, transfusion is almost a specific treatment and should be accompanied by phlebotomy. In diabetic coma it is useless.

Subcutaneous and Intramuscular Blood Injection

A limited amount of blood can be injected directly from a suitable donor to the patient hypodermically by means of a hypodermic syringe and needle. This method has been employed successfully in purpura and other hemorrhagic diseases in children. (*See* Blood Diseases.)

Dr. L. Buerger, of New York, in the *Journal of American Medical Association,* September 18th, 1915, recommends the following method of venous transfusion:

Fundamentally, my instrument is a stopcock, which alternately connects a syringe for blood to the donor and at the same time a syringe with saline to the recipient; by turning the cock, the syringe with blood is immediately connected to the recipient and the syringe with saline to the donor.

Alongside of the instrument, which has been fixed to a table, the arms of the patient and donor are placed. The tubes leading from the instrument are connected to the cannulas after the latter have been inserted into the recipient's and donor's veins. The operator then inserts a record syringe into the instrument and aspirates blood. When the syringe is filled, the assistant turns the stopcock, and the operator injects the blood. This is continued until the desired amount has been transfused. By means of the ether spray, a stream of ether is played on the barrel of the record syringe while it is being filled with and emptied of blood. The spraying apparatus consists of an 8-ounce bottle (filled with ether) into which is plugged the top of an ordinary throat atomizer. In order to produce a continuous stream of ether, I replace the single rubber bulb of the atomizer with the double bulb of the actual cautery.

The syringe method of transfusion has definite advantages which make it a method of choice when a transfusion of *whole unmodified blood* is desired. The method I have just described is an extremely simple and certain procedure. By it a transfusion of any amount can be very quickly done with *one* record syringe and *one* assistant. Skill and dexterity of the operator, which the older methods presuppose, are unnecessary.

C. Bier Hyperemia Treatment

Within recent years hyperemia treatment has deservedly found favor. It was popularized by the German surgeon, Professor August Bier, to whom we are indebted for having put it on a scientific basis. His researches have shown its effects to be analgesic, bactericidal, absorbent and nutritive in character.

Artificial hyperemia is either *active* or *passive,* or both may be simultaneously present.

FIG. 49.—BIER HYPEREMIA TREATMENT (Schwalbe).

ACTIVE HYPEREMIA.—The most practical way of producing active hyperemia, i. e., increased flow of arterial blood, is by heat, in the form of the hot water bottle, hot poultices, radiant light and electricity, hot sand, or hot air. Hot air is by far the most effectual, and numerous apparatuses are on the market for making it applicable to the various parts of the body, as shown further on.

PASSIVE HYPEREMIA.—Passive hyperemia results from the production of an increased flow of venous blood by means of suction cups or elastic compression and is particularly useful in painful afflictions.

Hot Air Apparatus.—The hot air apparatus consists of different shaped boxes or ovens, adapted to receive body or limb, and a source of heat, usually a gas or alcohol lamp; the hot air produced is conducted into the oven by means of a funnel or tube. The part to be treated is protected with cotton or felt from injury by burns through direct contact with the oven.

Treatment.—The treatment should be applied up to one hour once a day. A cold compress to the head is to be applied if any headache or drowsiness is felt, as sometimes happens with anemic or debilitated patients.

Elastic bandages and the suction cup are the principal means of producing passive hyperemia. Much care and attention should be given in placing them properly, as their effects depend entirely upon the way they are applied.

ELASTIC BANDAGES.—A one, two or three-inch Esmarch rubber bandage is applied over a light flannel bandage, proximate to the part under treatment, in such a manner that the turns of the bandage overlap and are wound tightly enough to make the superficial veins and the skin turn

a faint blue. Pain indicates that the bandage is too tight. Distally the part may be bandaged with an ordinary bandage. The part treated should feel warm, not cold, and the effect produced should be a pleasant one. The pulse should still be palpable. Persistent edema indicates that a bandage had been too tightly wound. The place of applying the rubber bandage should be varied a little from day to day.

The time of application depends upon the end in view. For instance, to increase formation of bone, the bandage is applied tightly for a few

Fig. 50.—Bier Hyperemia Treatment; Mode of Applying Bandage.

hours only. In chronic and acute inflammatory conditions it is put on somewhat loosely and left on up to twenty out of the twenty-four hours. The place of application should be changed every twelve hours.

In the absence of arteriosclerosis, hyperemia treatment to the head may be applied by a one-half inch wide rubber band placed around the neck below the larynx.

To treat a shoulder joint a heavy rubber tube is placed around the root of shoulder so that the ends cross, and these are then brought across the chest and back and held together under the other shoulder with a heavy clamp.

Suction Cups.—Suction cups, large and small and variously shaped,

from which the air is partly exhausted either by a small air pump or a rubber bulb, are employed. The skin under the bell should remain reddish. Generally they are applied for five minutes and then removed for three minutes, the process being repeated for three-quarters of an hour.

Résume.—The hyperemia treatment has done excellent service if given *lege artis* in such diseases as tuberculous affections of the joints, lungs, testicles, chronic and gonorrheal arthritis, local edemas after frac-

Fig. 51.—Bier's Suction Treatment for Abscess.

tures and from other causes, subacute and chronic rheumatism, infectious processes, neuralgias, etc. Suction cups are applied advantageously over a broken or incised skin to remove pus and secretions.

Tests and Examinations

A. Test Meals

The removal and examination of the stomach contents is of great diagnostic and prognostic importance.

If, for example, the introduction of the stomach tube to the fasting stomach (eight hours after eating) shows the presence of food or much gastric secretion containing free HCl, it suggests motor insufficiency and hypersecretion, while the giving of a test meal of known quantity and quality, and its removal and examination after a definite time, is an index

of the digestive power of the stomach, and often presents evidence of the presence of malignant disease.

In removing the meal an ordinary soft rubber stomach tube, connected with a funnel by about two feet of rubber tubing, or an aspirating arrangement, consisting either of a rubber bulb interposed between the stomach tube and the funnel, or a bottle aspirator equipped with a Potain syringe by means of which the air in the bottle is exhausted, may be used.

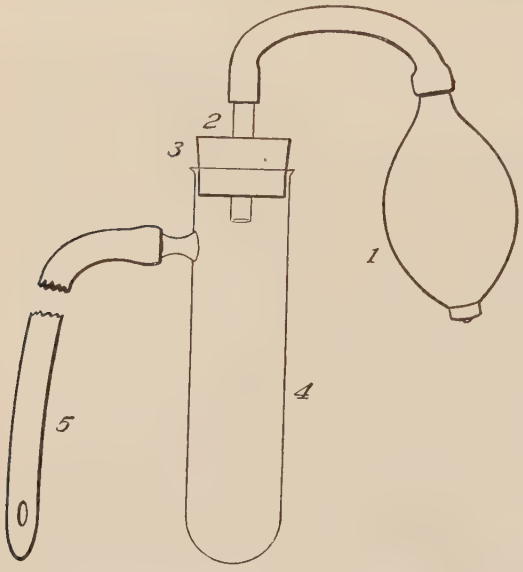


Fig. 52.—Gastric Aspirator and Stomach Pump (Dr. W. G. Morgan, Washington, D. C.).

With the patient sitting in a chair and his clothing protected by an apron, the operator depresses the root of the tongue with the index finger of his left hand, passes the well-lubricated tube into the pharynx and then instructs the patient to swallow. He then quickly pushes the tube into the stomach, encouraging him all the while to breathe deeply. Then the patient bends slightly forward and strains, with outward pressure over his stomach. This forces the stomach contents up the tube into a vessel held in readiness, or the tube is pulled out a small distance and pushed back again, thereby provoking contraction of the stomach.

To aspirate, the operator compresses the bulb, then the distal end of the tube, and then releases his hold on the bulb which fills with stomach contents. Following this he compresses the tube proximally and by pressing the bulb again he forces its contents out.

Ewald-Boas Test Breakfast

The Ewald-Boas test breakfast consists of one or two water rolls, weighing one or two ounces, and one or two cups of tea without milk or sugar. These are to be taken on a fasting stomach. This meal is extracted with the stomach tube one hour after eating.

Leube-Riegel Test Dinner

The Leube-Riegel test dinner is a mixed meal consisting of twelve to fourteen ounces of beef broth, about five ounces of beef or other meat, one

and one-half to two ounces of mashed potatoes and one ounce of wheat bread. The time for its removal is three to four hours after ingestion.

B. Scratch and Puncture Tests

Von Pirquet Test for Tuberculosis in Infants and Young Children

Two punctures or scratches are made in the skin of the forearm about one inch apart. A droplet of Koch's old tuberculin is rubbed into one of

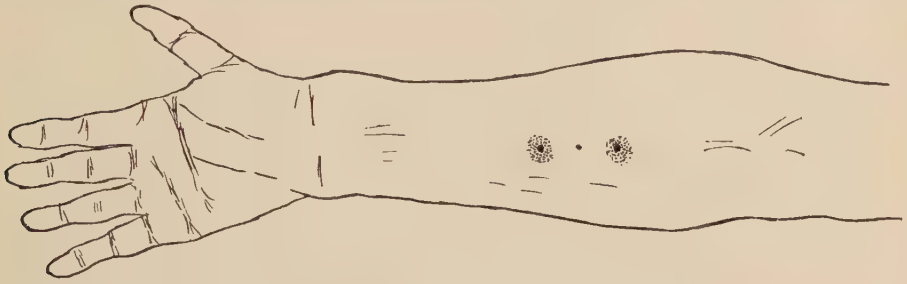


Fig. 53.—Von Pirquet Scratch Test for Tuberculosis.

the skin wounds—the other is not inoculated and acts as a control. After the wounds are dry they are protected by a gauze bandage.

If within twenty-four to forty-eight hours a slightly elevated red patch appears, the reaction is considered positive. In far advanced cases of tuberculosis this reaction is frequently absent.

Schick Reaction for Detecting Susceptibility to Diphtheria

Individuals with no antitoxin or with only a small amount of antitoxin in their blood and tissues are the ones to contract diphtheria. To detect this susceptibility we make use of the Schick reaction as follows:

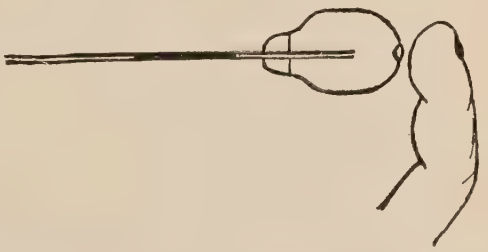


Fig. 54.—New York Health Board Schick Test Outfit.

A minute quantity of standard diphtheria toxin is injected intracutaneously in the flexor surface of the forearm. If antitoxin is absent or present only in quantity insufficient for protection, a positive reaction will appear within twenty-four to forty-eight hours, in the shape of a circumscribed area of redness and moderate infiltration which usually persists for about a week; on fading it shows scaling and a brownish pigmentation.

The quantity of toxin to be injected is one-fiftieth of the lethal

dose for a guinea pig in one cubic centimeter of normal salt solution.

A pseudoreaction appears earlier, is markedly infiltrated, but not sharply circumscribed, and disappears in twenty-four to forty-eight hours without scaling and with little pigmentation.

The injection is made with an all-glass syringe and a very fine needle.

New York Health Board Outfit for the Schick Reaction

The New York Health Board Outfit for the Schick Reaction is described by Dr. A. Zingher, as follows:

The outfit for the Schick test consists of a capillary tube and a small rubber bulb, such as are employed in the distribution of vaccine virus, and a bottle containing 10 c.c. of sterile physiologic saline solution (with 0.025 per cent phenol). The capillary tube contains 2 minimum lethal doses for the guinea pig of undiluted diphtheria toxin.

Directions for Use.—Break off one end of the capillary tube, and push the broken end carefully through the neck of the rubber bulb until it punctures the diaphragm within, and enters the cavity of the bulb; then break off the other end of the tube. Hold the bulb between thumb and middle finger, place the index finger over the opening in the larger end of the bulb and expel the toxin into the saline. Rinse out the capillary tube by drawing up saline several times, then cork the bottle and shake the diluted toxin. Inject exactly 0.1 c.c., representing 1/50 minimum lethal dose for the guinea pig, intracutaneously on the flexor surface of the forearm or arm. The contents of the bottle are sufficient for about eighty tests. On account of the fairly rapid deterioration, it is not advisable to use the diluted toxin after twelve hours. The outfit must be kept in the icebox to prevent deterioration.

The following is a summary on the value of the Schick test, by Doctors Kolmer and Mossage, Philadelphia:

Summary on the Value of the Schick Test

1. The toxin skin reaction is a valuable and reliable method for detecting susceptibility to diphtheria.

2. Persons reacting negatively to this test usually contain at least 1/20 unit of diphtheria antitoxin per cubic centimeter of serum, and this amount of antitoxin is probably sufficient to protect against infection.

3. Persons reacting weakly or strongly positive usually contain less than 1/40 of a unit of antitoxin per cubic centimeter of serum or none at all. These persons may be regarded as susceptible to diphtheria and in the event of exposure to infection should be passively immunized with an injection of antitoxin.

4. About 40 to 50 per cent of children ranging from 1 to 15 years of age react positively to the toxin test; this means that the preliminary use of the toxin test will eliminate the necessity of administering prophylactic doses of antitoxin to about 50 per cent of children.

5. The toxin reaction indicates that the immunity conferred by an injec-

tion of antitoxin begins to disappear after ten days and has generally passed away entirely after four weeks.

6. The increased susceptibility of persons with scarlet fever to diphtheria is shown by the toxin reaction; even after the injection of antitoxin about 10 per cent are susceptible within ten days.

7. According to the toxin reaction the immunity conferred by an attack of diphtheria is usually of short duration or entirely absent.

8. The most practical application of the toxin reaction consists in applying the test as a preliminary measure to all persons who have been exposed to diphtheria and immunizing only those who react positively.

Anaphylaxis or Hypersusceptibility (Author's Scratch Test)

When albuminous substances are introduced into the circulation other than by the way of the gastro-enteric tract (by subcutaneous, intraperitoneal or intravenous injection) the individual becomes sensitized for the specific proteid injected and for an indefinite time period but *not for any other form of proteid.* This process is best illustrated by citing the sugar experiment.

If grape sugar is injected into the vein of a guinea pig an immediate decomposition of the injected sugar does not take place. But soon thereafter a grape sugar splitting enzyme is formed in the blood, and a subsequent second injection of grape sugar is immediately reacted upon by this previously formed enzyme. In a similar way if an albuminous substance be injected into the vein of a guinea pig an enzyme is formed and thus a second injection of proteid two weeks after the first will be reacted upon the enzyme and the albuminous substance *will be peptonized in the circulation,* giving toxic anaphylactic symptoms similar to those observed when a peptone is injected directly into the veins of a non-sensitized guinea pig.

This is known as an *albumin peptone reaction,* and in anaphylaxis this peptone reaction is *specific for a specific variety of albumin and for none other.*

If we inject subcutaneously 1/100 c.c. of horse serum into a guinea pig and after two weeks 1 c.c. of human serum, no reaction will follow. If thereupon we inject 1 c.c. of horse serum, the animal becomes *anaphylactic.* Within half a minute it will scratch its nose, its hair will rise, fibrillary twitchings will be observed and the animal becomes comatose. Within two to three minutes severe tonic and clonic convulsions will set in and end in death. When this anaphylactic shock is too weak to kill, the rectal temperature of the animals sinks from 38° to 36° or 30° C. within the next eight to fourteen days, and no specific reaction in cases of recovery will follow a renewed injection of horse serum (*anti-anaphylaxis*). This well-known fact has been utilized in practice.

Human beings who show extreme sensitiveness to serum antitoxin

have been safely brought under its influence by beginning with minute doses and gradually increasing the dose.

These severe toxic anaphylactic phenomena have been observed so far only in guinea pigs. In rabbits, cats, dogs, chickens, human beings, a mild form of anaphylaxis has been reported, but not as yet sufficiently studied.

Primary serum antitoxin injections in the acute stage of diphtheria in human beings are, as experience has shown, harmless. The degree of sensitiveness to serum administered to a *sensitized individual* varies, according to the writer's experience, in different individuals. At no time has he observed serious results following the administration of serum to an already sensitized patient. In a limited number of cases in which the writer has injected antitoxin on various occasions, and years apart in the same individual, a violent erythematous eruption extending over the entire body was observed, but never a fatal result. (Author's scratch test.) As a possible safeguard for individuals previously sensitized by horse serum the writer has used and suggests the use of a *scratch test.*

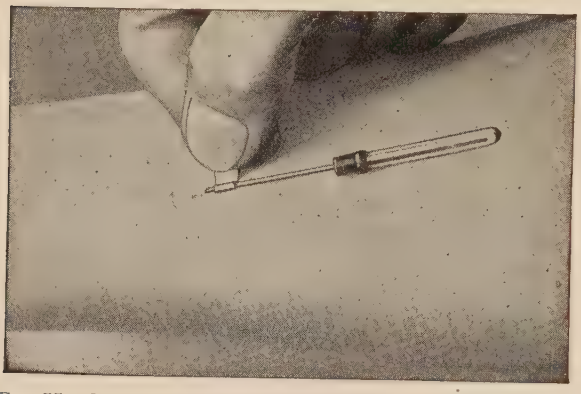


FIG. 55.—NOGUCHI'S LUETIN TEST FOR SYPHILIS. (Courtesy of Mulford Co.)

This test is made in the same way as the von Pirquet test for tuberculosis. If a minute quantity of serum rubbed into a scratch in the skin should be followed within a few hours by severe local or systemic reaction, its further introduction into the system in the full therapeutic dose would be contra-indicated. Moreover, it would seem important to employ in already sensitized persons an antitoxin *derived from some other animal than the horse, or an antitoxin disassociated from albumin, if that were possible.* The writer's experience with the *scratch test* is as yet too limited to permit of a statement as to its definite value. (*Tr. Am. Pediat. Soc., 1911.*)

The Luetin Intradermic Test

Luetin is an extract of killed cultures of a number of strains of the Treponema pallidum (Spirochaeta pallida) carefully sterilized and placed in sterile glass ampules or intradermic syringes.

A positive reaction manifests itself in the form of a pustule, papule, or other inflammation at the site of injection.

The luetin reaction is specific for syphilis. It occurs most constantly and intensely during tertiary and latent stages. It is usually absent, or very mild, in primary or secondary stages, although in these stages it may become positive after energetic treatment. In infants it is less marked than in adults with congenital syphilis.

Scratch Test for Allergy (Food Idiosyncrasy)

Technic.—Clean the arm with alcohol and ether. Scarify superficially in two places with a von Pirquet needle or a toothpick *without drawing blood.* Rub a soluble protein into one of the wounds. An extensive list of soluble proteins is now obtainable.

Results.—A positive reaction will manifest itself in 10 to 30 minutes in the shape of a blotchy papular eruption about the size of a silver quarter dollar, accompanied by intense itching over arm or entire body. Asthmatic breathing may set in soon afterwards, apart from the toxic action of ingested food. The usual disturbances due to protein sensitization are vomiting, abdominal pain, diarrhea, urticaria, angioneurotic edema, erythema, eczema, asthma.

Treatment.—Food idiosyncrasy is treated by eliminating the irritating article from the diet or by feeding it gradually in increasing amounts.

Basal Metabolism

Basal metabolism is the heat produced by the body in the fasting state (14 to 18 hours after eating), at complete physical and mental rest, and at a comfortable surrounding temperature.

The determination of the rate of basal metabolism is now being employed in various conditions both as a method in diagnosis and as a guide to treatment. At present, the method chiefly used in making this determination is that of indirect calorimetry, which consists of measuring the amounts of oxygen consumed and carbon dioxide eliminated by the body under the conditions mentioned above.

The apparatus required for making this test is quite elaborate and the technic involved is exceedingly complicated. The use of the test, therefore, is necessarily restricted to the specialist or skilled clinician.

Of the conditions in which the determination of the metabolic rate is found useful, those of the thyroid gland are by far the most important. Other conditions in which it is employed are those of the pituitary body, the anemias and leukemias.

C. Familiar Reflexes—Special Sense and Other Phenomena

1. Reflexes

Reflexes are motor phenomena of great importance in the diagnosis of diseases of the nervous system.

Cutaneous Reflexes.—Cutaneous reflexes are elicited by irritation of the nerves of the skin or mucous membranes. The degree of reflex action is then termed *normal, decreased* or *increased.*

Reflexes may be delayed or absent, as in shock, in disease of the brain and spinal cord involving the reflex centers and in peripheral nerve diseases. They are increased whenever the irritability of the cutaneous nerves is increased, as in strychnin poisoning.

Tendon Reflexes.—Tendon reflexes are elicited by striking or tapping the muscle tendons, where accessible, causing a contraction in the corresponding muscles.

Pupillary Light Reflex.—This consists in a narrowing of the pupils of both eyes when a light is suddenly held in front of one eye, the other eye being shaded. The process may be repeated several times by alternately shading both eyes and then exposing one to the light.

Argyll-Robertson Pupil.—The pupil responds to accommodation, but not to light; found in locomotor ataxia, general paralysis of the insane and cerebral syphilis.

The Knee Jerk or Patellar Reflex.—This is obtained by striking the quadriceps extensor tendon between its insertion and the patella. The patient is directed to loosely cross his leg over the other knee or to let it hang over the operator's arm.

This reflex is exaggerated in lateral and disseminated sclerosis, incomplete lesions of the cord above the lumbar segment, irritability of the cord as in meningitis, hysteria and strychnin poisoning. It is absent or diminished in tabes dorsalis, neuritis, pseudomuscular hypertrophy, myelitis, poliomyelitis, etc.

Babinski's Reflex.—Irritation of the skin of the sole of the foot causes extension instead of flexion of the toes. It is found in lesions of the pyramidal tract, in organic (but not hysterical) hemiplegia.

This sign may exist normally in young children and temporarily after convulsions, but it is nevertheless of value in deciding between paralyzed conditions and hysteria, as it never occurs in the latter.

Kernig's Sign.—Kernig's sign consists in the inability to extend the leg fully on the thigh when the thigh is at a right angle with the trunk, or to flex the thigh to a right angle with the trunk, when the leg is extended on the thigh. Though not constantly present, it is of value in the diagnosis of meningitis, both of the cerebrospinal and the tuberculous type, but it also occurs at times in other diseases of the nervous system, for instance, in cerebral and meningeal hemorrhage, chronic encephalitis, hemiplegia, cerebral abscess and hysteria. Moreover, it is occasionally present in acute infectious diseases—notably typhoid fever and pneumonia.

In infancy, however, it is very rarely found either in health or disease, except in *meningitis*—in fact so rarely that its presence is suggestive of

meningitis, but there are cases of meningitis in which it is never found, and others in which it is only intermittently present.

Ankle Clonus.—This is the term applied to vibratory movements of the foot produced by sudden and forcible flexion of the foot on the leg. It is an indication of disturbance of function in the lateral columns of the spinal cord and occurs most frequently in lateral sclerosis and in hysteria.

Brudzinski's Reflex.—In meningitis, if the head is flexed upon the anterior chest, the legs draw up simultaneously.

Tâche Cerebrale.—This is a vasomotor skin phenomenon. When the skin is scratched a red streak makes its appearance and soon disappears. *A tardy response and disappearance* is observed in meningitis, in gastro-intestinal toxemia and in persons subject to urticaria.

This phenomenon in itself is of minor practical importance; it is of value only in connection with other distinctive signs of a central irritation (meningitis).

Chvostek's Sign.—Chvostek's sign is a peculiar excitability of the muscles of the face so that spasms are produced if the trunks of the facial nerve are lightly percussed. This occurs particularly in tetany, occurring in this condition even if the skin is lightly stroked.

2. Special Sense and Other Phenomena

Sensory phenomena may be either increased—*hyperesthesia*—decreased or absent—*anesthesia*—or perverted—*paresthesia.*

In testing these it is important to have the patient shut his eyes in order to avoid his visual control of the results. The usual tests include examinations of the tactile and pressure pain and thermal sensibility.

Tactile and Pressure Sensibility.—Tactile and pressure sensibility is tested for by touching the patient's skin lightly or firmly with the finger, or in finer tests with a camel's hair brush, and he is asked if he feels anything and what and where.

By testing and comparing the results over symmetrical parts of the body, areas of abnormal sensibility can be mapped out.

Sensibility to Pain.—The sensibility to pain is examined for by pricking the patient with a pin. Here it is of special importance to note any delay in the appreciation of pain, as is so common in tabes dorsalis and peripheral neuritis.

Sensibility to Heat and Cold.—This is tested for by touching symmetrical parts of the body simultaneously or alternately with test tubes filled with hot and cold water, and having the patient tell what he feels, or by breathing upon his skin with the mouth wide open and again with the mouth closed. In the former case the breath should feel warmer and in the latter cold.

Hyperesthesia.—Hyperesthesia is a condition of excessive pain sensation in certain areas, especially of the skin upon the slightest stimulation. It occurs principally in the early stages of neuritis, in cross-lesions of the spinal cord, in hysteria and in neurasthenia.

Reflex Sensation is related to hyperesthesia, and is confined to certain areas corresponding to various internal organs. The most important of these are: trigeminal neuralgia in frontal sinus disease; laryngeal pain in percussing a pulmonary abscess; pain in the left arm in angina pectoris; pain in the back in stomach disease; tickling of the nose in intestinal worms; pain in the right shoulder in liver disease; pain in the left shoulder in disease of the spleen; pain in the lumbar region and the genitalia in diseases of the bladder; pain in the epigastrium and the stomach region in endometritis and in menstruation.

Anesthesia.—Anesthesia of the skin is due to disturbances in the conduction of impulses from the body surface to the centers of sensation. It may be caused by neuritis, traumatism to the nerve trunk, hysteria, diseases of the sensory tracts of the cord or brain, drugs and caustics, such as morphin and carbolic acid. Anesthesia of the skin may be partial or complete and is limited to the areas supplied by the nerves affected.

Paresthesia.—Paresthesia is the term given to abnormal subjective sensations in the skin, like numbness, itching, tingling, formication, "falling asleep," etc., as occur in irritation of the peripheral nerves, in hysteria, neurasthenia, spinal cord affections, and which are spoken of as "girdle pains," etc.

Macewen's Sign.—If the stethoscope is placed over the frontal bone near the root of the nose, tapping of the parietal bone will elicit a tympanitic cracked pot sound in cases in which there is intracranial pressure or effusion.

Stokes-Adams' Syndrome.—This is a symptom complex consisting of bradycardia, visible auricular pulsation in the veins of the neck, and vertigo or syncope. It occurs in heart block.

Romberg's Symptom.—An ataxic patient is unable to stand steadily if his eyes are closed and his feet together; he will sway from side to side or backwards and forwards and may even fall down.

Tests for Seeing.—To determine the acuteness of vision ophthalmologic text-books should be consulted for exact directions.

Pronounced defects in the visual field can, however, be readily recognized by a simple method. The patient, with his left eye closed, should sit opposite the examiner, who closes his right eye. The examiner then moves his finger in a frontal plane halfway between the two eyes from the periphery into the field of vision; he can then directly compare the patient's field of vision with his own.

Tests for Hearing.—Hearing may be tested for by air conduction or bone conduction. The former method consists in determining the maxi-

mum distance at which the ticking of a watch or the vibrations of a tuning fork can be heard on each side. In testing by bone conduction the watch or tuning fork is held over the mastoid process and any difference between the two sides is determined by the patient's statements.

Tests for Tasting.—In testing the taste function a soft brush moistened with weak acetic acid and then with salt water should be applied first to the anterior part and then to the posterior part of the tongue and separately on each side. The patient should keep his tongue protruded and breathe through his nose, and reply to questions by motioning with his head. The anterior part of the tongue is supplied by the trigeminus and the posterior by the glossopharyngeal nerve; hence the necessity for testing the two parts separately.

Tests for Smelling.—To test the sense of smelling we employ substances of different odors, such as cologne water, asafetida, ammonia and acetic acid, and direct the patient to smell each of them, closing first one nostril and then the other, noting any difference between the two sides. A rhinoscopic examination should be made to determine whether a difference is not due to alterations in the mucous membranes. A unilateral diminution of smell appears most frequently with the hemianesthesias of hysteria and with traumatic neuroses, and is usually purely functional.

D. Securing Specimens for Blood Tests and Examinations

White and Red Blood Counts.—To do a white and red blood count requires a blood-counting apparatus, containing a graduated pipet for each and a glass slide with a counting chamber and cover glass. To be accurate the count should be done at once after filling the pipet.

After cleaning the finger tip or ear lobe with alcohol and ether and pricking it with a lancet or needle, a large drop of blood is allowed to exude with a minimum of pressure.

Red Blood Count.—For the red blood count a convenient method is to suck up the blood into the pipet to the mark 0.5, and Toisson's diluting fluid to the mark 101.

White Blood Count.—For the white count fill the smaller pipet with blood to the mark 0.5 and with 0.3 per cent dilute acetic acid to the mark 11.

To obtain homogeneous mixtures both pipets should be immediately and thoroughly agitated.

Differential Blood Count—Examination for Malarial Parasites.—To do a differential blood count or to examine for malarial parasites a small drop of blood is obtained in the above-mentioned manner and is placed on a glass slide near the end. Then with the edge of another slide, placed at an angle of about 45 degrees, the drop is drawn out with firm pressure into a thin film and the latter dried by agitating the slide in the air.

Microscopical Examination of Fresh Blood.—This is less often done than blood counts and that of smears, but to the experienced it furnishes valuable information.

A small drop of blood is obtained on a clean glass slide or on a thin cover glass and immediately covered with another cover glass, so that a thin disk forms between the two.

Fig. 56.—Withdrawal of Blood from a Vein for Examination. (After Foote, "Minor Surgery.")

Widal Test for Typhoid Fever.—For the Widal test for typhoid fever, let two separate drops fall on a glass slide and allow them to dry in the air.

Wassermann Test.—For the Wassermann test for syphilis collect about one dram of blood from a vein in a test tube and send to the laboratory promptly or put on ice. As fibrin interferes with the test, it is well to prevent its formation by placing some glass beads in the tube and agitating it for some time.

Blood Cultures.—In sepsis, cultures of the infecting organism from the blood stream of the patient often gives important information and at the same time enables the physician to obtain an autogenous vaccine.

A partly tight bandage is placed around the upper arm, and with an aseptic syringe 4 to 8 c.c. of blood are then removed from a superficial vein of the patient, under strictest aseptic precautions, and immediately inoculated into several flasks of broth and agar-agar tubes or plates.

The laboratory will do the rest.

Blood Pressure Observations.—These are made with the aid of special apparatus. Printed instructions as to the *modus operandi* accompany each instrument.

E. Smears, Discharges, Secretions, Puncture Fluids

Materials Required.—The materials required are glass slides, a sterile applicator or swab and a speculum or depressor.

A sterile swab is made by twisting a bit of cotton around the rough-

ened end of a stiff wire or applicator, which is sterilized in dry heat, after placing it in a test tube plugged with cotton.

Then with the seat of trouble well exposed the applicator or swab is dipped into the material and wiped over several glass slides so that thin transparent films are obtained. These are allowed to dry, are labeled and placed one on top of the other, and separated by a piece of twine or adhesive plaster so that the surfaces do not touch.

Examination for Treponema Pallidum

A smear for examination for treponema pallidum is made in the following manner: The chancre is cleansed and dried with gauze. Then with firm pressure on the sides of the penis some serum is pressed out of the ulcer, and with a platinum loop a little of it is removed from the margin of the ulcer and placed on a glass slide. This is mixed with a drop or two of India ink and covered with another slide, and the two slides are then drawn out horizontally. Two films are obtained in this manner.

The spirochaetae show up unstained under the microscope.

Examination of Sputum

It is important to obtain the first morning sputum which is hawked up after rising, so as to get material from the deeper respiratory passages and not simply secretion from the mouth and pharynx. Collect it in a small wide-mouthed well-stoppered vial and send it to the laboratory promptly.

Examination of Feces

Up-to-date feces examinations require the entire amount evacuated to be collected and deposited directly into a wide-mouthed jar which should be put on ice until ready to be sent to the laboratory.

If amebae are to be looked for, the jar should be warm and the specimen be kept warm until ready for examination.

Examination of Urine

Routine Examination.—For routine examination it is only necessary to collect a single urine in a clean bottle.

Twenty-four Hour Specimen.—A twenty-four hour specimen is obtained by collecting the entire amount of urine passed from any hour of one day to the same hour the next day.

The urine should be placed in a cold place and sent to the laboratory *in toto,* or a sample should be taken and forwarded, after thoroughly mixing and accurately measuring the total quantity.

To Prevent Urine from Spoiling.—A few drops of formalin or crystals of chloral hydrate may be added for this purpose.

Cultures.—If a culture is to be made, 2 to 3 drams of urine should be withdrawn with a catheter, under aseptic precautions, and collected in a sterile test tube.

To Obtain Urine from Either Kidney Separately.—To accomplish this catheterization of the ureters may be performed.

Examination of Breast Milk

By means of the breast pump several ounces of breast milk can be secured for examination as to percentage composition and bacteria content.

Examination of Cerebrospinal Fluid

See Spinal Puncture.

Search for Gallstones

The best time to search for gallstones is during one or two days after an attack of colic.

The stools are put into a fairly close-meshed sieve, mixed with water and stirred until nothing remains but the stones, if present.

Collecting Material at the Bedside for Bacteriological Examination

This is best done by procuring *culture tubes,* which may be obtained in most localities from health boards or supply houses. They are furnished with broth, gelatin, agar-agar or blood serum, according to the bacteria suspected.

Mode of Procedure.—The inoculation is performed with a platinum needle—sterilized by heating it in a flame, or with a sterile swab.

For a fluid culture medium a needle is employed with a little loop at the end. A solid medium is stabbed with a straight needle to near the bottom of the tube, or, if on the slant, its surface is smeared with a swab or a needle.

The infectious material is obtained by dipping the applicator gently into the pus, care being taken to touch nothing else.

To avoid contamination the cotton plug of the tube should be held between the index and middle fingers so as to remain sterile.

If culture tubes are not obtainable the material should be sent to the laboratory in a sterile test tube or glass pipet, or if withdrawn with a syringe, the latter may be sent there wrapped up in sterile cotton.

Glass pipets are improvised by heating and drawing out a thin three to four inch long glass tube into capillary tubes in two places, about an inch apart. One end is broken off, and after sterilizing the tube by heating it over a flame, a bulb from a medicine dropper is attached to the wide end. The material is then sucked up into the bulbous portion of the tube, which is then sealed up at both constricted parts by holding these in a flame.

Preserving Pathologic Specimens

For preserving pathologic specimens a ten per cent dilution of liquor formaldehyd in alcohol is satisfactory.

Isolation and Disinfection

(*See also* Section III)

In our larger cities facilities are offered for isolation and proper care of those sick with diphtheria, scarlet fever and other communicable diseases. But in localities where the care of the sick remains with the family it is the duty of the physician to see to it that isolation and disinfection of the premises and of the excreta be properly attended to.

A room well-adapted for isolation is one which has plenty of sunshine and which can be readily and thoroughly ventilated. It should be removed as far as possible from the living rooms of the rest of the family, and furnished very simply—without curtains, carpets and unnecessary articles of furniture.

The attendant should not come in direct contact with members of the family and none should be admitted to the sickroom except the physician. For the physician there should be in readiness a sterilized gown and hood which are donned before entering and removed immediately after leaving.

During isolation, discharges and excreta—especially of typhoid fever cases—should be thoroughly disinfected.

All dishes, knives, forks, spoons, etc., should be kept in the room and be washed in a carbolic acid solution and then with water or soapsuds.

Discharges from nose and throat should be received on gauze or cloth or in a sputum box, to be incinerated. If handkerchiefs are used these should be immersed in carbolic acid or bichlorid solution.

Excreta.—Especially in typhoid fever is it important to thoroughly disinfect urine, feces and all other discharges, because they often contain infectious germs in great numbers. *Urine* to which one-third of its volume of a five per cent solution of carbolic acid has been added, will be disinfected within a few minutes.

Feces should be thoroughly mixed with the solution and be exposed to its effects for some time before being discarded. It is well to have the urinal and bedpan partly filled with the disinfectant all the time.

The attendant should form the habit of disinfecting his arms and hands frequently, especially after handling vessels with discharges and after making applications to throat or nose.

It is almost unnecessary to say that unconsumed articles of food should not be returned to the kitchen, but should be burnt.

When a scarlet fever case is ready to leave quarantine the entire body should be bathed and anointed with oil or ointment and the hair washed with hot soapsuds. The patient should then be dressed in clean clothes and removed from the sickroom. The discarded clothes of the patient as well as of the attendant—who also should take a bath—are to be left in the sickroom, for disinfection, with the room and its contents.

In case of death, the body should immediately be wrapped in a sheet moistened with a bichlorid solution (1 to 1,000). The sickroom must be thoroughly fumigated and walls and floor sprayed with a disinfectant.

Because of the danger of carrying the infection the physician should order or, if possible, supervise the disinfection of rooms that have been occupied or frequented by persons suffering from communicable diseases.

Disinfection is comparatively so simple a matter that there is no excuse for neglect in regard to it.

It is very little more than thorough cleansing and thorough ventilation. After cleansing the floor and woodwork with soap and water, it can be washed down with bichlorid solution (1 to 1,000).

Fumigation of Premises

Fumigation is not much in vogue, since we recognize that infection is brought about principally by contact with living carriers. Fumigation is accomplished in the following manner:

All cracks and crevices in doors and windows should be calked with cotton to prevent the escape of gas. Linen blankets and coverings of all kinds, as well as mattresses, should be exposed in the best possible way.

Disinfectants.—For disinfection one of the following substances may be used:

Formalin.—Six ounces of the commercial forty per cent solution of formaldehyd for each one thousand cubic feet of airspace; time of exposure, four hours. If there is no distilling apparatus at hand, one quart of the solution may be mixed with six and one-half ounces of permanganate of potash in a porcelain dish placed in water. This quantity will suffice for a fairly large room.

Instead of the fluid, formalin in paste form may be employed.

Paraform.—Three-quarters of an ounce for each one thousand cubic feet; to be boiled; time of exposure, six hours.

Sulphur.—Four pounds to be burned; time of exposure, eight hours.

Disinfection of Washable Materials.—All washable goods—personal clothing, bed linen, etc.—should be immersed in a two and one-half per cent solution of carbolic acid which is prepared by adding three ounces of pure carbolic acid to one gallon of hot water. After having been soaked in this solution for two to three hours they may be removed and should then be boiled in water and soapsuds for fifteen minutes.

Instead of carbolic acid solution one of bichlorid of mercury (1 to 1,000) may be employed.

New York Health Board Regulations

Quarantine in Certain Emergencies.—When any case of diphtheria, epidemic cerebrospinal meningitis, measles, scarlet fever, smallpox, or typhus fever is not or cannot be properly isolated on the premises and cannot be removed to a suitable hospital, it shall be the duty of the local health officer to forbid any member of the household from leaving the premises, except under such conditions as he may specify.

Maximum Period of Incubation.—For the purpose of this code, the maximum period of incubation (that is, between the date of the exposure to disease and the date of its development), of the following communicable diseases is hereby declared to be as follows:

Chickenpox	21 days
Measles	14 "
Mumps	21 "
Scarlet fever	7 "
Smallpox	20 "
Whooping-cough	14 "

Minimum Period of Isolation.—The minimum period of isolation, within the meaning of this code, shall be as follows:

Chickenpox, until twelve days after the appearance of the eruption and until the crusts have fallen and the scars are completely healed.

Diphtheria (membranous croup), until two successive negative cultures have been obtained from the nose and throat at intervals of twenty-four hours.

Measles, until ten days after the appearance of the rash and until all discharges from the nose, ears and throat have disappeared and until the cough has ceased.

Mumps, until two weeks after the appearance of the disease and one week after the disappearance of the swelling.

Scarlet fever, until thirty days after the development of the disease and until all discharges from the nose, ears and throat, or suppurating glands have ceased.

Smallpox, until fourteen days after the development of the disease and until scabs have all separated and the scars completely healed.

Whooping-cough, until eight weeks after the development of the disease or until one week after the last characteristic cough.

Communicable and Reportable Diseases

The Sanitary Code of New York State gives the following list:

Anthrax
Chickenpox
Cholera, Asiatic
Diphtheria (membranous croup)
Dysentery, amebic and bacillary
Epidemic cerebrospinal meningitis
Epidemic or streptococcus (septic) sore throat
German measles
Glanders
Measles
Mumps
Ophthalmia neonatorum
Paratyphoid fever
Plague
Poliomyelitis, acute anterior (infantile paralysis)
Puerperal septicemia
Rabies
Scarlet fever
Smallpox
Trachoma
Tuberculosis
Typhoid fever
Typhus fever
Whooping-cough.

Regulation for Reporting Cases of Communicable Disease by Physicians.—It shall be the duty of every physician to report to the local health officer, within whose jurisdiction such patient is, the full name, age, and address of every person affected with a communicable disease, together with the name of the disease, within twenty-four hours from the time when the case is first seen by him. Such report shall be by telephone or telegram, when practicable, and shall also be made in writing.

Labor-Saving and Comfort Devices for the Sickroom

Bed Rests.—Much comfort is given during sickness as well as in convalescence by change of position. Especially grateful is the change to a sitting or reclining position.

In hospitals an adjustable back rest is in general use; in the household

an ordinary kitchen chair turned upside down is a good substitute. To prevent the patient from slipping downward, a twisted bed sheet may be secured to the side of the bed and adjusted to support the buttocks.

Invalid Beds and Couches.—There are on the market a number of

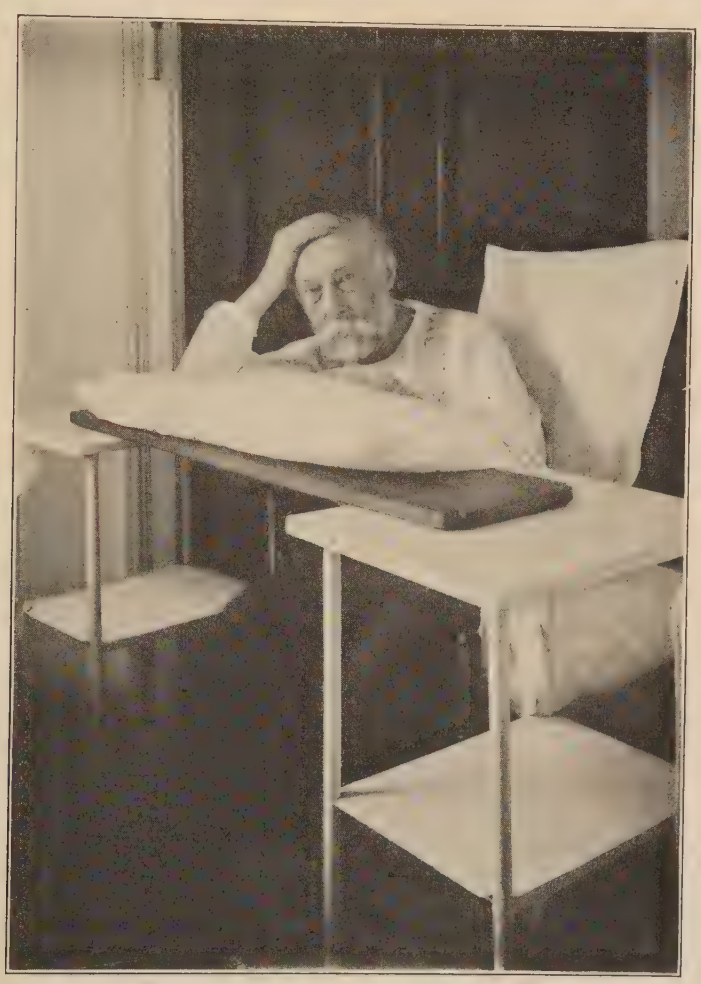


FIG. 57.—POSITION IN WHICH PERSONS WITH URGENT DYSPNEA MAY GET REST AND SLEEP.

invalid beds with springs and mattresses which can be partly removed or are adjusted to the needs of the patient.

Tilting of the Bed.—This is at times a helpful measure, especially when an increased flow of blood to the brain is desired, as in fainting spells or in anemic conditions generally, also in bronchopneumonia with profuse secretion. The foot end of the bed may be raised by means of blocks put under the posts.

Sleeping in chair is often a necessity for patients suffering from any form of severe dyspnea. It can be made quite comfortable by placing a wide board over the side pieces of an arm chair; the patient leans slightly forward, resting his head on pillows and on his folded arms. (*See* Fig. 57.)

Roll Chairs.—Roll chairs are a great convenience for chronic invalids.

Section II

Blood Diseases—Lymphatic Derangements—Blood, Serum and Vaccine Therapy

Blood Diseases

Introductory Remarks

From a clinical standpoint the blood may be looked upon as a mobile tissue, as liable to infection as any other tissue.

The prophylactic exclusion of *exogenous* toxic factors is a possibility depending principally upon the normal resistance to infection which is given at the usual portals of entrance by the healthy skin and mucosa. When skin and mucosa are unbroken and in healthy action, when the vital forces are sustained by a normal digestion and a normal supply of life-giving oxygen, infection does not readily take place. Thus, hygienic living and the correction of apparently trivial local disturbances constitute practical preventive measures. In this connection the screening against insects and precautions against disease carriers must be emphasized.

The prevention of *endogenous* infection involves hygienic measures and the early removal of internal foci of disease. In the treatment of blood conditions hygienic measures play an important rôle. Chemotherapy by mouth, by subcutanous and intravenous injection, has given positive good results. Sera and vaccines as therapeutic agents have a wide range of usefulness. The efficacy of x-rays and radium is not as yet firmly established; on the other hand, blood transfusion has established its value and promises great results for the future, especially after the technic of transfusion has been simplified.

The Anemias

The term *anemia* may be defined as a decrease in the blood of certain of its constituents. This refers in the main to hemoglobin and to the red

cells. The white blood cells often assume a relative preponderance.

The division of anemias into primary and secondary forms is an arbitrary one. From a therapeutic standpoint it would seem desirable to class all forms of anemia as secondary, but as the etiology of important forms of anemia is still clouded in obscurity we may adhere for the present to the old classification, with the understanding that the toxic factor must be sought for as a matter of routine in every case which presents itself for treatment.

Anemia Due to Hemorrhage

Clinical Varieties.—Acute anemia due to hemorrhage from injury or to gastro-intestinal ulcer (simple, typhoid, tuberculous, malignant).

Anemia due to pulmonary hemorrhage.

Anemia due to obstetrical hemorrhage (extra-uterine pregnancy, antepartum and postpartum hemorrhage).

Anemia due to menorrhagia and metrorrhagia from fibroids or malignant tumors.

Anemia due to genito-urinary hemorrhage (simple, malignant, stone).

Anemia of constitutional and toxic origin; hemophilia, scurvy, purpura, hemorrhage of the newborn.

Anemia from hemorrhoids; varicose veins; aneurysm.

Anemia from concealed hemorrhage.

Treatment.—In the general treatment of anemia from hemorrhage, if the loss of blood is excessive and a condition akin to shock is present, the patient must be put to bed with the foot of the bed raised.

An ice bag or ice coil should be applied as near as possible to the suspected source of hemorrhage, i. e., the epigastrium in gastric ulcer, etc. If the blood pressure is high, the *nitrites* are indicated; if low, with rapid pulse, a carminative, alcohol, camphor or ether (by hypodermic injection) is indicated. Morphin can be used to overcome nervous symptoms.

The source of hemorrhage should of course be determined as soon as possible and the vessel compressed or ligated. Styptics, i. e., *adrenalin, alum, tannic acid, peroxid, lead acetate,* can be applied where there is capillary hemorrhage, but simple pressure and applications of hot water are quite effective. *Cauterization* by galvanocautery was formerly much employed in this connection. The frequent ingestion of small quantities of simple fluid, water, weak coffee or tea will be found salutary.

Thromboplastin (Tissue Extract) as a Hemostatic.—In the *Journal of the American Medical Association,* April 24, 1915, Dr. A. F. Hess, of New York, reported on the above preparation as follows:

> The preparation of thromboplastin is simple and inexpensive. Ox brains are obtained fresh from the slaughter-house, stripped of their membranes, washed in running water, and weighed. They are then passed through a meat

chopping machine three times, and an equal amount of normal salt solution is added. This suspension is allowed to remain in the refrigerator for forty-eight hours, and it is then twice pressed through cheese-cloth. This extract, which contains fine suspension of tissue in addition to tissue juice, is diluted with one-half its quantity of salt solution. Tricresol is then added in proper proportion so that the finished preparation contains 0.3 per cent. Aërobic and anaërobic cultures of this fluid have repeatedly been found sterile. It maintains its hemostatic potency for many months.

In the same journal (*Journal of the American Medical Association*), February 19, 1916, Dr. J. J. Cronin, of the Division of Children, New York Health Board, reports his experience with thromboplastin in hemorrhage after tonsillectomy and the removal of adenoids:

The tonsils were thoroughly removed and a pledget of gauze saturated with this preparation was immediately applied to the cut surface; it was likewise applied in the nasopharynx immediately following the removal of the adenoids. The results were striking. The patients showed only a little bloody saliva after being put to bed. Healing was expedited, and many patients were entirely well at the end of four days.

As a result of this initial favorable experience, the routine use of thromboplastin was extended to Department of Health Nose and Throat Clinics.

I may add, in conclusion, that not in a single instance has the operator or nurse been compelled to return to the clinic to care for a bleeder after operation since the use of thromboplastin was made a routine procedure. We now feel that in case a hemorrhage did occur, any trained nurse could apply the hemostatic while awaiting the arrival of the medical inspector.

Although thromboplastin solution is used liberally in the throat, and no doubt some of it is swallowed, there has not been any case of illness resulting. Thromboplastin is safe, effective and easily applied.

In pulmonary hemorrhage patients are often very seriously frightened. Physicians must then exercise all their powers of reassurance. If necessary, morphin must be given. (*See* Article on Tuberculosis.)

After the immediate danger from hemorrhage is passed, the underlying or primary condition, i. e., gastric ulcer, typhoid, or hemorrhoids, must be treated.

To replace the lost blood we resort to the use of physiological saline solution in amounts of one to two pints. To increase peripheral resistance, thus stimulating the heart and raising the blood pressure, we add *adrenalin chlorid solution* (gtt. 10) to the pint of saline. *Hypodermoclysis* or *transfusion* into a prominent vein of the forearm are the two choices of method of administration. *Blood transfusion* by the cannula or gravity methods can also be used, if there is time to examine the blood of the donor and recipient for hemolysis, agglutination, etc. (*See* Transfusion in Section on Bedside Technic.)

Whole Blood and Blood Serum Injections.—Whole blood and blood serum injections are now extensively employed for the purpose of checking hemorrhage when ordinary methods fail.

In hemorrhage of the newborn a few syringefuls of blood taken directly from some healthy member of the family and injected subcutaneously is usually effective. This method does not require preliminary hemological tests.

Animal blood serum is used in 15,0 to 60,0 (℥iv to ℥ii) doses subcutaneously every other day. Dry blood serum under the name of *coagulose* is now everywhere obtainable.

For further information regarding the control of hemorrhage *see* Section XIV on Emergencies of General Practice; also Article on Blood Therapy in this section.

In cases of excessive hemorrhage it will take many months to regenerate blood back to the normal. The aftercare and recuperative treatment of these patients are, of course, important and will be discussed in the chapter on Anemia Secondary to Chronic Diseases.

Hemophilia, scurvy and purpura are elsewhere discussed.

Anemias of Infancy

Slight deviations from the normal standards of adult blood are not pathological in infants under two years of age. The hemoglobin may fluctuate around 65; the number of red cells often reaches 6,000,000 per c.c., and occasional nucleated forms are found; the number of white cells averages from 10,000 to 14,000, of which number 40 per cent of mononuclear lymphocytes is an average.

In infancy blood is poorer in solids than in adult life. Leukocytosis and severe anemia is produced by trivial causes. Reaction of the spleen and bone marrow is frequent and characteristic in infantile anemias; here the relation of cause and effect is still a subject of lively controversy. Counterparts of certain adult anemias occur rarely in infants and are not important enough to merit special description; such are chlorosis, pernicious anemia, leukemia and Hodgkin's disease.

Malnutrition Anemia

Malnutrition stands first among the variety of causes of infantile anemias, especially in the first months. Therefore we must correct dietary errors.

Here the importance of the protein constituent of food is well recognized. In organic combination it holds the important element—iron. During the first nine months the protein is best supplied in the form of mother's milk. When for various reasons cow's milk, undiluted or diluted, has to be used, a certain grade of composition and purity should be required.

Albumen water, which is made by adding the white of a fresh egg and a pinch of salt to one-half pint of sterile water, has a low caloric value.

Beef juice is useful. A piece of round steak may be placed in a meat squeezer and the juice expressed and collected in a glass tumbler. This is placed in a water bath, the temperature of which is slowly brought to a boil. Care should be used not to boil the beef juice which, of course, would coagulate.

Whey, also rich in protein, is fluid obtained from strained milk which has been prepared by the addition of rennet.

A very valuable protein food is eiweissmilch or albumen milk. Its caloric value is twice that of whey. The technic of its preparation is given in Section I.

In infancy the anemias due to malnutrition are usually interwoven with some fault of feeding, which must then be first corrected. There is as yet no rule of three by which we can feed infants—each case stands for itself.

The manipulation of the protein rich foods should be made with careful regard to indications, the details of which are outlined in Section I. Albumen water, eiweissmilch or beef juice should not be used for prolonged periods. As soon as possible the infant should be placed on a daily diet of human milk or its next best substitute—cow's milk properly modified, or modified goat's milk.

After nine to twelve months malnutrition anemias assume a different aspect. Lactation usually ceases and the weaning process begins. Therefore by the tenth to the twelfth month the child should subsist principally on cow's milk, in addition to which there should be a daily allowance of one to two ounces of beef juice, a soft boiled egg or a light meat broth, also orange juice. Prolonged exclusive feeding of cow's milk is a common cause of secondary anemia and rachitis.

Other foods, rich in iron, increasing in availability as the child grows older, are rare beef and mutton, chicken, lamb and fish, bone marrow, fruit, green vegetables—spinach, asparagus, fresh peas, string beans. These are gradually added to the list in time. (*See* Diet after the Age of One Year—Section I.)

Where the severity of the case warrants, rest in bed is of course advisable, but children cannot be controlled like adults. Warmth is at all times essential. Removal of patients to the country where there is a maximum of fresh air and sunlight is beneficial. Hydrotherapy in the form of cool baths is of service, if the patient can bear them, but in every case they should be combined with friction.

Drugs are secondary in importance, but are of considerable benefit in secondary anemia occurring after the first year. The best drugs are iron and arsenic combined or used alternately. Syrup of ferric iodid for

the younger children is most popular in doses of 3i t.i.d.; Blaud's pills, reduced iron, and iron tropon are most suitable for older children. Arsenic can be added if enlargement of the spleen or lymphatics is present. In all deficiency diseases *vitamines* in the shape of *autolyzed yeast* should be administered. (*See* Section I.)

Blood injections are occasionally required. (*See* Section I.)

Splenic Anemia

Splenic enlargement so often accompanies secondary anemia as to give rise to a term *splenic anemia,* in an attempt to separately classify the condition. It is not a primary anemia, but it is usually associated with malnutrition, rickets, syphilis or malaria.

Fig. 58.—Splenic Anemia; von Jaksch Pseudoleukemia (Splenectomy).

Treatment.—The treatment of splenic anemia in general must be directed to the underlying cause. The specific therapy of syphilis or malaria should be employed wherever indicated by appropriate blood examination.

Disorders of nutrition and intestinal toxemia must be corrected. In rickets cod-liver oil and phosphorus should be prescribed, also *autolyzed yeast.*

The usual treatment of secondary anemia should be instituted. Blood injections are advisable; splenectomy is not curative as a rule. Exposure of the spleen to the x-rays is recommended.

Banti's Disease

Banti's name is attached to a symptom complex, which includes a progressive anemia, irregular fever, hemorrhage from the stomach and bowels, enlargement of the spleen, cirrhosis, and eventually death

Treatment.—Treatment should include, first of all, a search for the etiologic factor.

Exposure of the spleen to the x-ray and the general supportive treatment of plenty of fresh air, sunshine, hydrotherapy and good food, with careful nursing in the first months, are all measures which are sometimes

found sufficiently effective. Where these failed splenectomy has given good results in some cases. Before operative measures are resorted to blood transfusion should be tried.

Gaucher's Splenomegaly

Gaucher's splenomegaly is a familial disease—fatal in children and rather benign in adults—the prominent feature of which is the enormous growth of the spleen, probably neoplastic in nature. Hepatic enlargement and a simple anemia accompany the enlarged spleen.

Treatment.—As in Banti's disease, we should look for a causal factor —luetic, malarial or some other infection.

Splenectomy certainly relieves symptoms, but whether it effects a cure is still open to question. Repeated blood injections should be tried before splenectomy is performed.

Pernicious Anemia

Pernicious anemia is a severe progressive anemia of unknown etiology, characterized clinically by remissions of symptoms and a blood picture presenting an extreme reduction of red cells with marked changes in their structure and a relative high hemoglobin index.

Clinical Appearance.—The onset is usually insidious. Patients have a pallor of a lemon-yellow tint and are flabby; there is no response to treatment and a cause for the anemia is hard to find; extreme languor and susceptibility to fatigue are characteristic; hemorrhage from the skin and mucous membranes, including the retina, are common; gastro-intestinal disturbances often appear; moderate fever is usual; edema of extremities appears finally. Death almost invariably results.

Treatment.—Since the best authorities unite in believing the *cause* of pernicious anemia to be outside the blood rather than in the blood itself, the progressive physician should begin his treatment by making a most searching examination of his patient.

Is the causal focus infective, parasitic or malignant? To find the answer we may have to examine the ears, teeth, throat, abdomen and rectum. There should follow chemical, bacteriological and serological blood tests, examination of gastric contents, investigation of the predominating bacterial flora of stools.

This variety of anemia, it is believed by some, is caused by a specific putrefaction in one part of the gastro-intestinal tract due to excessive ingestion of protein. *Hemolysis* is present in pernicious anemia to a marked degree and very likely is produced by some toxin. Attention has been recently centered on the spleen.

Splenectomy, reënforced by *blood transfusion,* is frequently followed by temporary improvement—particularly as to red cell formation, and on

these grounds the measure is endorsed. In connection with causal treatment rather than by itself, transfusion by recently improved technic—the syringe and cannula method or the sodium citrate method—will improve, if not cure, the disease in a clinical sense.

Based upon the theory that the disease is caused by a species of food poison causing atrophy of the gastric mucosa, frequent and thorough lavage of the stomach has been practiced. Restriction of proteins of animal origin is advised. Mild catharsis and irrigations of the colon are based upon similar reasoning, and in addition designed to overcome gastro-intestinal stasis which occupies another place in the suspected etiology of the disease.

Arsenic has for years enjoyed great popularity in the treatment of cryptogenetic anemia. The basis of its popularity is founded upon its stimulating properties on the bone marrow. *Fowler's solution,* beginning with small doses of min. v, t.i.d., and working up to tolerance, is a simple way of prescribing arsenic. *Atoxyl* or *sodium cacodylate* are used hypodermically. The use of *salvarsan* in this disease has been reported negatively. There seems to be no favorable results from the use of *bone marrow. Serum therapy* has been reported upon favorably by Bartolitti, an Italian observer. He has injected 1,000 units of *antidiphtheria serum* at intervals of 4, 3 and 2 weeks and has observed increase of hemoglobin and the number of red cells. *Antistreptococcus* serum and *antistaphylococcus* serum are effective in a lesser degree. He combines the use of the serum with organotherapy, using a combined extract of *spleen, spinal cord* and *blood* in daily increasing doses, commencing with 0,5, gradually reaching 2,75 gm. and then decreasing.

Rest in bed, or at least avoidance of physical or mental strain, and removal to the country where there is plenty of sunlight and fresh air should be advised. Dietary regulation is not of prime importance. Grawitz, however, restricts protein and orders vegetables in purée form. Nitrogenous foods seem particularly prone to intestinal fermentation.

Organic forms of iron have no particular advantages, but on the contrary are not as easily absorbed as the inorganic forms. Symptoms of overdose should be watched for—dyspepsia, colic and constipation.

Hand in hand with the drug treatment we should emphasize the necessity for rest. In the beginning patients must stay in bed from one to three weeks. The bedroom must be sunny, cheerful and well ventilated. Exertion must be carefully regulated from day to day so that no excessive demands may retard convalescence. Domination of patients has a beneficial influence as in chlorosis, because of the nervous disturbances usually present. To guard against relapse, close observation during convalescence with intercurrent treatment had better be employed.

Hydrotherapy can be used with advantage in all cases. *Sweat baths* are good; as many as two or three a week are prescribed. Warm or tepid

showers for severe cases and cold baths with friction for the lighter cases are of benefit. Carbonic acid brine baths, wet rubs and dry rubs are recommended.

Climatic treatment is important. If the patient usually exists in the close confined quarters of urban life he or she should, if possible, be sent to the mountains. The mild weather conditions of the southern states are, of course, highly desirable during the winter months. At other seasons of the year the higher altitudes of the mountainous regions are preferable.

Constipation is a frequent symptom. To overcome the consequent intestinal toxemia, daily catharsis by salines is advised.

Chlorosis

Chlorosis is a primary anemia occurring most frequently in young females and is characterized clinically by a greenish yellow skin. The clinical picture is usually marked by a gradual onset, in girls shortly after puberty, of a peculiar yellow tint in their complexions. Constipation, dyspepsia, dyspnea on exertion, with functional derangement of the heart and nervous disturbances are common in this condition. The blood shows a marked decrease of hemoglobin with a color index of one minus and a large number of poikilocytes.

Prophylaxis.—To intelligently approach this phase of the treatment we simply avoid the suspected causes of the disease—*firstly,* by decreasing auto-intoxication and treating constipation, and *secondly,* by instituting hygiene of mind and body and arranging for a sufficient amount of rest, good food, sunshine and fresh air. Heredity is said to play a part in chlorosis, hence special stress should be laid on the hygiene of the child in families in which chlorosis has occurred.

Treatment.—Iron is the specific remedy for this disease. The varieties of preparations to choose from are many: *organic* or *inorganic.* The most popular form of the inorganic variety is *Blaud's pill,* beginning with one pill, t.i.d., p.c., for the first week, two pills, t.i.d., for the second week and three pills, t.i.d., for the third week. The tincture of ferric chlorid and the syrup of the iodid of iron are also effective. Tartrate of iron and potassium (5 to 10 grains) daily may be prescribed. Protofer is also a valuable remedy.

Hygiene of the bowels should be inaugurated. Cascara is serviceable in this connection. Colon irrigations are excellent as a routine procedure.

For cases rebellious to iron we have to resort to *arsenic,* which can be used in the same form as in the treatment of pernicious anemia.

In hypochlorhydria min. x, t.i.d., of diluted hydrochloric acid and in hyperchlorhydria, the administration of the alkalis, magnesia usta, soda bicarbonate, etc., are of benefit.

For anorexia the bitter stomachics are used, but are inferior as regards results, to hydrotherapy and hygiene.

Diet is, of course, important. This should contain an abundance of protein; therefore eggs, milk, meat, meat broths, vegetables rich in iron—spinach, asparagus—stewed and fresh fruit of all kinds.

Cases of chlorosis which do not respond to the above outlined management should have the benefit of *blood transfusion.*

Anemias Secondary to Chronic Diseases or to a Definite Recognizable Cause

The clinical picture varies. Symptoms are familiar and yet protean, depending on a variety of causes. Usually there is pallor of the skin and mucous membranes, loss of strength, emaciation, palpitation and heart murmurs, chilliness of extremities, shallow and hurried respirations, dyspepsia, menstrual irregularity in women, dizziness, vertigo, drowsiness. Finally edema and subnormal temperature set in.

Causes.—In the treatment of this variety of anemia success depends upon the recognition of the cause. Let us enumerate them:

1. Hemorrhage—open or concealed. (Treated under a previous heading.)
2. Acute infectious fevers.
3. Chronic infectious diseases—syphilis, tuberculosis, malaria, rheumatism, endocarditis, sepsis, chronic nephritis and hepatitis, tropical diseases.
4. Intestinal parasites.
5. Malignant growths.
6. Auto-intoxication.
7. Metallic poisoning. Arsenic and lead.
8. Certain coal tars, such as antipyrin and phenacetin.
9. Faulty hygiene—bad air, insufficient and improper nutrition (undernourishment).

Treatment.—Unfortunately our present knowledge of many of the above diseases leaves much to be desired. We have to consider that certain conditions—malignancy, Bright's disease and chronic sepsis—produce a constant drain on the albumin of the blood and also some hemolysis. The most effective treatment, therefore, is the one which emphasizes *the treatment of the primary malady.*

While the beneficial effects of iron, even by itself, are conceded, rest, fresh air and good food are essential. If the patient's strength does not permit his removal from bed, a room well ventilated, with a maximum of sunlight, should be chosen. If the patient can be sent to the country the best place is one of a moderate elevation, warm temperature and not too near the seashore. Exercise should be of a mild variety: short rides in

the automobile, walking and horseback riding. Change of surroundings is often very salutary.

Diet is important because it provides one of the means by which we can introduce iron into the system. The foods rich in iron are meats, especially in the form of scraped beef, meat juices and broths, eggs, milk. Vegetables rich in iron are spinach, asparagus, string beans. Fruits form an important part in the dietary.

Where the stomach is the seat of the primary trouble, we had best proceed carefully. Here the Lenhartz or von Leube regimes may be employed. In the anemias, in which anorexia and other gastric symptoms are common, the stomach should never be overtaxed. The practice of giving patients three large meals should be replaced by administering small, frequent ones. Mild hydrotherapeutic measures combined with friction are valuable. It is best to avoid severe measures.

To overcome the deficiency of iron, the profession has for many years placed its main reliance on drugs, namely, *iron* and *arsenic*. Aside from the controversy regarding the absorption of iron in drug form, we must not forget the affirmative testimony of many generations of physicians.

Iron is administered in organic or inorganic form. Organic varieties are legion—ferratin, iron tropon, peptomangan, ferrosajodin, and others. Within reason it can be stated that the same results can be secured with the inorganic form. Tablets or capsules of *reduced iron*—gr. i, t.i.d., p.c. —or pills of the *carbonate of iron* (Blaud's) are convenient forms of administration.

Injection of the salts of iron is not advisable because of slow absorption and subsequent pain. In gastric diseases the administration of iron by mouth is contra-indicated, as the stomach does not bear the drug well.

Among the natural springs in this country which contain iron are those at Saratoga and Hot Springs.

Arsenic is said to stimulate hemopoiesis. It is often given with bone marrow.

Blood transfusion is indicated in cases which show no improvement following the routine treatment.

Aplastic Anemia

This is a rare form of anemia, characterized by the pallor or atrophy of the erythroblastic tissue in the bone marrow. The condition furnishes an interesting contrast to the redness or hyperplasia of the bone marrow in pernicious anemia. Clinically the disease is akin to pernicious anemia. It occurs earlier in life, is more common in females, has no remissions and usually has a rapid, fatal course with hemorrhagic tendency.

Treatment.—Inasmuch as the patient usually dies in a few months, treatment seems to exert little influence. The therapy is that of pernicious anemia, unles a cause can be found.

In one case reported recently the condition followed a gonorrheal infection.

Leukemia

This is a condition characterized by a great increase in the number of leukocytes, associated with hyperplastic changes in the bone marrow, spleen and lymphatic glands, separately or together.

Fig. 59.—Splenic Leukemia.

Types.—There are two types:

1. Splenomedullary Type.—This is the more common type. The onset is usually insidious, attended by increasing malaise with enlarged lymph glands, and enlarged spleen. There is often a marked tendency to hemorrhage and loss of weight, with pallor and fever.

The special symptoms are priapism and leukemic retinitis. Examination of the blood shows an enormous increase of white cells among which the myelocytes predominate. Otherwise, the blood picture is that of a severe secondary anemia.

2. Lymphatic Type.—The onset may be acute or chronic, the special feature of which is glandular enlargement of the lymph glands, often involving the spleen. It is quite fatal. The blood picture shows usually an increase of white cells about one-half that of the myeloid type. The lymphocytes predominate here.

Treatment.—Especially among German investigators there is a suspicion that careful inquiry into the history of leukemic patients will usually elicit, at some time or another, the history of some infection, such as malaria, lues or tonsillitis, which has in time formed a nidus in the

bone marrow or some other hematopoietic organ. This is in accord with the results of recent investigators of other countries, especially in the United States. In addition, the theory has been advanced that because of chronicity, the infection becomes of low grade virulence which in turn prepares a ripe soil for subsequent infection. Thus it is quite probable that leukemias often represent double infections. These facts especially apply to hematopoietic organs—the bone marrow, spleen and lymphatic organs; therefore, foci of infection should be sought for and the offending organism isolated from the blood and tissue by the most careful technic possible, in an effort to pursue a rational therapy. Tangible results, however, have still to be demonstrated from rational methods, and for the present we have to resort to procedures essentially palliative.

Among such measures the *x-ray* occupies a prominent place. It is most efficacious in the myelogenous variety, but it is also useful in the lymphatic variety. Decrease in the size of the spleen, reduction of the enlarged glands and decrease in the number of leukocytes follow its use. A leukocytic ferment is probably formed, as has been demonstrated, by phenomena following the injection of blood serum of leukemic patients who have been subjected to the ray. It is a matter of choice whether the exposure should be maximum in amount, repeated at long intervals—four to five weeks—or a daily short exposure of ten minutes' duration of a milliampere. The rays are directed against the thighs, in the theory that the bone marrow is the seat of the disease and therefore also against the spleen, and against an enlarged group of glands. Needless to say the best results are obtained in the hands of experienced röntgenologists.

In the drug treatment of leukemia *arsenic* and *iron* have been given considerable importance. Their benefit is now being questioned. If used at all, arsenic should be administered to tolerance, by mouth, in the form of Fowler's solution—min. iii, t.i.d.—or hypodermically in the form of sodium cacodylate 2 mgm. in one cubic centimeter of water on alternate days. Alternately or in conjunction with arsenic, one can give iron in the form of Blaud's pill.

More recently there has flashed into prominence a powerful leukotoxin, *benzol*. It has a powerful action on the blood-forming system, the bone marrow, spleen and lymph glands. Like arsenic it behaves most favorably when used in conjunction with the x-ray. Its action is estimated to decrease the size of the spleen and reduce the number of leukocytes.

Benzol is given by mouth in gelatin-coated capsules, containing 0,5 gms. each of olive oil and chemically pure benzene; it is given to the number of four a day, amounting to 2 gms. The dose is gradually raised to 3 to 5 gms. daily. It can also be injected hypodermically—1,5 to 2 gms.—every second day. To prevent benzol poisoning we must employ the drug with great caution; as soon as the number of white cells drop to 30,000

it should be stopped. Headache, vertigo, albuminuria and hematuria are danger signals. *It is contra-indicated in Bright's disease.*

Naphthalene tetrachlorid—gr. vii, q. 3 h.—has also been recommended.

Splenectomy is of no use in leukemia. *Hydrotherapeutic measures* should be mild and adjusted to the strength of the patient. Patients do best in a moderate altitude or at the seashore, the important factor being a constant abundance of fresh air, sunlight, rest and the mildest exercise. The diet should be fairly full and stimulating, easily assimilated and nitrogenous. Inhalations of oxygen—20 to 40 gallons daily—are highly recommended in the treatment of dyspnea and anemia. Other symptoms should be handled appropriately as they arise.

To recapitulate, the best treatment is one which is not too vigorous and which includes the *Röntgen ray.* Under such a regime, patients may defer death for years. *Benzol* should be used very cautiously. *Blood transfusion* may be tried.

Hodgkin's Disease

(*Pseudoleukemia*)

Hodgkin's disease is a disease characterized by a progressive enlargement of one or more groups of lymphatic glands, by the presence of anemia, and later accompanied by lymphoid growths in the spleen, liver and other organs.

We shall not concern ourselves here with the dispute regarding the different conceptions of the terms Hodgkin's disease and pseudoleukemia, preferring to consider them synonymous. If there is such a condition as pseudoleukemia—a hyperplasia of hematopoietic tissues, such as glands, spleen, etc.—without the characteristic blood picture of leukemia, it seems best for our purposes to consider such conditions as leukemia. Pathologists take the position that the leukemic blood changes must occur in such condition at some time sooner or later.

Symptoms.—The onset of symptoms is usually quite insidious. In one of the author's cases the disease followed a mild attack of typhus fever. Enlargement of a group of superficial glands is the first sign. Usually the left or right cervical, less frequently the inguinal group, and in very insidious cases the deeper glands, are first involved. Other glands are affected in due course. Pressure symptoms from the enlarged glands develop and a progressive cachexia sets in. Moderate fever is usually in evidence with frequent remissions to the normal.

As soon as Hodgkin's disease is suspected, one of the accessible glands should be excised and examined by a competent pathologist.

In acute cases it usually comes to a rapid issue, the patient dying from exhaustion. Very frequently we find that pulmonary or other com-

plications set in and terminate life, but there are cases on record which recuperate from such an acute attack.

Multiple glandular enlargement, a low red blood count and leukocytosis are bad signs.

Prophylaxis.—Apart from hygienic living and avoidance of severe infections we know of no preventive measures against Hodgkin's disease.

Treatment.—At the present time the therapeutic outlook in Hodgkin's disease is somewhat hopeful. The theory that the disease is one of infectious origin has gained ground. The Bacillus Hodgkini, a pleomorphic diphtheroid organism, is claimed as the etiologic factor and has been isolated from affected lymph glands. With pure cultures of this organism, monkeys were subcutaneously inoculated and analogous lesions of the disease were reproduced. Besides doing such creditable work in establishing the etiology of Hodgkin's disease, Yates and Bunting have formulated a plan of treatment which has given encouraging results in their hands:

1. Removal of the Source of Infection.—A careful study is made of those tissues drained by the affected glands. Special emphasis is made with respect to the teeth, tonsils, ears, nose, eyes and accessory structures.

2. Extirpation of the Major Portion of the Disease.—Whenever the condition of the patient permits, there should be a total extirpation of the affected glands. This applies especially to the cervical and axillary region.

3. Destruction of Bacteria by the Röntgen Ray.—The x-ray should be applied to the affected areas in therapeutic doses, by skilled röntgenologists, not as a substitute, but as a supplementary aid to surgical treatment. The duration of the treatment should be prolonged for months, if necessary.

4. Hygiene.—In an effort to bring the resistant forces to their highest pitch of efficiency, so as to wall off the infection, the patient must be allowed an abundance of fresh air, sunlight and good food, with plenty of rest. The authors consider the beneficial effect of arsenic but temporary.

5. Vaccines.—They have not sufficient evidence in their use to render a verdict for or against vaccines.

As far as vaccines are concerned, Rosenow and Billings have made vaccines from the diphtheroid organisms isolated from affected glands. From the use of these, especially when combined with x-ray treatment, they have had a fair amount of success. Rosenow has a stock vaccine which he administers at five-day intervals, to the total number of 62,000,000 bacilli.

Every feature considered, we must, for ordinary purposes, look upon the disease as a grave one. Tuberculosis, syphilis, malaria and other infections should be excluded by appropriate bacteriological, hematological and serological tests.

Arsenic has for many years been the most widely used drug in the treatment of Hodgkin's disease. It should be given to the limit of tolerance. *Fowler's solution, atoxyl* and *salvarsan* are the various forms used. Ehrlich recommended *arsacetin*—gr. ¾, t.i.d.—to tolerance. *Arsenic* causes the glands to become smaller. Symptoms should be treated appropriately as they arise. Most observers have heretofore considered that the x-ray is most effective in the early stages. The usual procedure is to apply the rays every five days to the affected area with a moderate intensity for fifteen minutes. Hygiene is important.

Resumé.—Blood transfusion, in combination with an autogenous vaccine, ozone inhalations and radium treatment, atoxyl internally and neosalvarsan intravenously, are probably the best therapeutic procedures in the present state of our knowledge.

Patients who improve may remain in good health for a number of years and then succumb to an acute recrudescence of the disease; therefore constant protection of the general health should be established.

A recovery can be considered as established when there is no trace of the disease (including a normal blood picture) at least five years after the last manifestation of the infection.

Hemophilia

Hemophilia is a condition characterized by a tendency to uncontrollable hemorrhage after slight wounds. There is often an associated arthritis. Individuals inheriting this tendency are known as bleeders.

Slight cuts, traumatic lesions, tooth extractions, as also postpartum injuries are followed by hemorrhage which prove more difficult to control the more often they occur. A prolongation of the coagulation time of the blood is readily established by the blotting paper test and coagulometer.

Prophylaxis.—Prophylaxis commences before birth and includes the prohibition of marriage of females closely related to hemophilics, as it is believed that through them the hemophilic diathesis is transmitted to males. Bleeders should protect themselves from all forms of trauma; they should consider well the dangers of surgical operations. The bowels are always to be kept open. They must be encouraged to live in a fresh and mild equable climate. Cold douches or sponge baths are beneficial.

Treatment.—Immediate measures in the care of hemorrhage are absolute rest and pressure at external sites of bleeding. If the source of hemorrhage is accessible the application of fluff or plugs of gauze or pledgets of cotton, soaked with adrenalin, hydrogen peroxid, alum water or silver nitrate, combined with strong manual pressure directly to the wound is advisable.

A mixture of fresh blood serum and organic extracts, such as spleen, thymus, testis, lymph glands, a ten per cent antipyrin solution, solutions

of sesquichlorid of iron, tampons of calcium chlorid (2 to 30), offer a further selection of local measures which can usually be relied upon to stop the bleeding. When the hemorrhage is especially obstinate, additional pressure should be exerted proximally over the larger tributary vessels of supply; or the actual cautery can be applied to a visible bleeding point.

Cases of internal hemorrhage—stomach and intestines—should be treated with ice externally, and internally with adrenalin solutions and tannic acid.

Internal Treatment.—As regards internal treatment, our object is to increase the coagulability of the blood.

For this purpose *chlorid of calcium* and blood serum are used. Chlorid of calcium is usually given to adults in 20 grain doses, four times per day, and may be continued after a hemorrhage to guard against recurrence. It may also be given as a preliminary course to prepare bleeders for operation.

Thyroid extract has also been administered to control bleeding. Of late the introduction of *blood serum* of animals has brought a very hopeful aspect to the treatment of hemophilia.

Antidiphtheritic serum may be employed, and is everywhere obtainable and blood serum in powder form in sterile ampules is in the market under the name of *coagulose*.

The dose of blood serum is 10 to 15 c.c., administered hypodermically and repeated daily. The same procedure is carried out in preparing hemophiliacs for operation.

The hypodermic injection of 15 to 30 c.c. of *whole human blood* from the vein of some member of the bleeder's family is now frequently practiced and has the advantage of not requiring a test for hemolysis and agglutination. Splenic extract administered hypodermically has given good results.

Hemorrhagic Diathesis of the Newborn

This is a congenital condition in which there is present a tendency to hemorrhage from the smaller blood vessels—from the navel, the mucous membranes, especially of the mouth, the stomach and the intestines, of the skin, genito-urinary tract and meninges.

Clinical Appearance.—It occurs very early in life—in the first few weeks. The diagnosis is made on the appearance of the hemorrhage either at the umbilicus, under the skin, from the mouth or in the stools. If the hemorrhage is severe the child is at first restless, and finally prostration with rapid, feeble pulse develops.

Treatment.—The disease is said to depend upon some alteration in the blood or blood vessels, but no precise information as to the cause exists. Syphilis or some bacterial infection is probably responsible in

some cases; on the other hand the condition may be an expression of some form of toxic poisoning, such as chloroform poisoning or asphyxia.

Until recently the treatment of hemorrhages of the newborn was ineffective and rather hopeless. Some cases of milder consequence recover spontaneously.

Lespinasse very logically considers three indications in the treatment: first, *to stop the hemorrhage;* second, *to replace the lost blood;* third, *to overcome the infection,* if possible. Transfusion practically meets all three indications.

Crile's technic consists in connecting the radial artery of the donor with the femoral vein of the baby. J. E. Welch has devised a method by which he collects, under sterile precautions, the serum of any normal adult, and injects amounts of 10 c.c. into the buttocks of the infant every two hours. Horse serum, if collected and administered under similar sterile conditions, is also effective.

Schloss and Comiskey have reported good results from the following method: Small amounts, 3 to 10 c.c., of blood are withdrawn from a convenient superficial vein of the mother or a healthy adult, by a sterile Luer syringe, and injected as *whole blood* into the buttocks of the child where the blood is quickly absorbed into the circulation. The happy results of transfusion, serum or whole blood injections are apparent within twenty-four hours. Probably because of the reënforcement of complement and antibodies, they often succeed in overcoming the disease itself.

As soon as feasible an attempt should be made to ascertain the cause of the condition. If syphilis or any other infection is present, it should be properly treated. Proper warmth should be maintained and stimulation administered if necessary. Other symptoms are to be treated as they arise.

Purpura

All varieties of purpura are characterized by hemorrhage under the skin, mucous membranes or into the viscera. There is often an associated arthritis. In a broad sense purpura is an acquired hemorrhagic diathesis of bacterial or toxic origin.

Various Forms.—Purpura is mild or severe. We can distinguish the following varieties:

1. Purpura Simplex.—This is a very mild, afebrile form, common in children. Pain in the joints may or may not be present. Petechial spots or ecchymoses appear on the lower, and occasionally on the upper, extremities. Usually it disappears in seven to ten days.

2. Purpura Rheumatica.—Purpura rheumatica is most frequent in adult males. Premonitory signs are depression with polyarthritis followed by the appearance of purpuric swellings and possibly nodular lesions,

usually in the lower extremities and joints. Sore throat and malaise may be present. The attacks last about two weeks and may recur.

3. Purpura Urticans.—Purpura urticans is accompanied by wheals with or without joint involvement. It resembles purpura rheumatica.

4. Purpura Hemorrhagica (Henoch's purpura).—This is a severe type. It has a short incubation period marked by malaise, slight fever and joint pain. Moderate or profuse hemorrhages into the skin, mucous membranes and internal viscera characterize this form.

Fig. 60.—Purpura Hemorrhagica Following Pyocyaneous Ear Infection. Blood Transfusion. Recovery.

Etiology.—Purpura may or may not be a symptom. Among the etiological factors are:

1. Infections—septicemia, typhus, smallpox, acute yellow atrophy of the liver.

2. Toxic: drug poisoning (iodids, copaiba), intestinal auto-intoxication, anaphylactic phenomena—snake poisoning.

3. Other causes recognized by observers are the cachexia of cancer, phthisis, etc., rheumatic infection, mechanical strain, nervous disorders, arteriosclerosis.

Treatment.—Definite etiological factors are usually absent, and the important indication is therefore to minimize all trauma. This is accomplished by ordering the patient to bed, and enforcing absolute rest of mind and body.

The nurse should be instructed to be as gentle as possible in manipulating the patient. The bed clothing above and below the patient is to be kept as smooth and free from wrinkles as possible. The rigor of these instructions is not to be relaxed until several days after the hemorrhages disappear. Only by these means can we protect the patient against recurrence of hemorrhages. Important adjuncts are the maintenance of a plentiful supply of sunshine, fresh air and cheerful surroundings. If the weather conditions and house facilities are convenient, the patient can be moved to the porch.

The diet is simple. Milk, eggs, cereals and fruit juices are recommended. So far as drugs are concerned the *salicylates, aromatic sul-*

phuric acid and *ergot* have not yielded a uniformity of successful results. The results with calcium lactate and calcium chlorid are disappointing.

Because of the possibility of causing new hemorrhages by friction the patient cannot be bathed until a week after the hemorrhages have ceased to appear. Then warm baths may be ordered which can gradually be made cooler. Warm salt water baths are often beneficial.

When rest in bed and the administration of a laxative followed by sodium salicylate and aromatic sulphuric acid does not avail, the injection of serum or whole blood, as described in the section on Hemophilia, can be recommended.

Injections of whole blood from a healthy donor, given subcutaneously in amounts starting with 20 c.c., administered every day and increasing the dosage by 10 c.c. each time, have been found effective. The injection of antidiphtheritic serum in amounts of 20 c.c. divided in two, given once a day, has also arrested purpuric attacks.

E. Frank,[1] of Berlin, has outlined a rational treatment which he recommends for severe cases. A donor, preferably a blood relation, is secured; otherwise the blood must be tested for syphilis, agglutinins and hemolysins. The plasma of 500 c.c. is then injected into the vein of the patient, supplying the deficiency of blood platelets. He advises intravenous injections of 10 c.c. of a 10 per cent saline solution to arrest intestinal hemorrhage. *Arsenic* may be administered internally to reënforce the treatment. During convalescence the iodids may be given.

Scurvy

This is an acquired hemorrhagic diathesis due to infection or intestinal toxemia.

The epidemic form is easily diagnosed; the recognition of the mild sporadic type is sometimes a difficult matter. Often the patient has been subsisting on a monotonous diet.

Symptoms.—The onset is usually insidious with the gradual appearance of physical and mental apathy. Sponginess of the gums and hemorrhages of the mucous membranes and skin, especially of the thigh and lower leg, are characteristic.

Prophylaxis.—By various investigators scurvy has been traced to ptomains derived from tainted animal food, to infectious microörganisms —particularly those existing in the mouth, to a deficiency of potassium salts in the food, to a deficiency of alkaline salts in the diet, producing a diminished alkalinity of the blood, and to poor sanitary and hygienic surroundings. Most recently a theory gaining credence is that involving

[1] Frank, E., *Berl. klin. Wchnschr.*, May, 1915.

the withdrawal of an element called *vitamin,* usually present in fresh vegetables but absent in dried ones.

In the light of these theories which severally may have more or less foundation in fact, the wisdom of providing a full and mixed diet at all times is quite apparent. Preserved vegetables and fruits should not be omitted from the ship's stores when embarking on a long voyage.

Among foodstuffs of antiscorbutic value are included fresh potatoes, cabbage, carrots, milk, malt liquors, light wines, tea, cider, and lime juice. Only in limited amount is the use of alcohol permissible.

Sanitary and hygienic regulations should be enforced, also good ventilation and moderate exercise. Meats should be kept fresh by refrigeration or should be well preserved. Other foods, especially of the fermentable variety, must be kept in hermetically sealed jars.

Treatment.—Inasmuch as the cause of the disease is nutritional and toxic, a diet rich in potassium salts and organic acids—fruit and fresh vegetables—should be prescribed. To particularize, the juice of fresh oranges or lemons or any succulent fruit, eggs, lettuce, spinach and potatoes, offer a sufficient variety to make up a daily menu. The beneficial results are usually soon apparent; the addition of scraped meat or chicken can be made as soon as the condition of the stomach permits. In some parts of Europe an exclusive raw milk diet is prescribed after a diagnosis of scorbutus is made.

Rest in bed and an abundance of sunshine and fresh air are powerful aids in the treatment of scurvy. Complication and sequelae should not be neglected. It is surprising how even those cases attended with pleural and pericardial effusion improve under rest and diet.

Bleeding gums may be painted with tincture of myrrh or iodin. Stimulating mouth washes are potassium permanganate—gr. i to the ounce—or boric acid—gr. x to the ounce. For actual ulceration a solution of chlorate of potassium—one per cent—or a silver nitrate stick may be used.

Diarrhea may require medication; and for use in this connection the bismuth salts, tannalbin or starch enemas are valuable. Effusions if they interfere with normal functions may be aspirated. Mild massage is often recommended to help absorption of subcutaneous hemorrhage. Injections of serum, as described in the treatment of hemophiliacs, may help in the very severe cases. During the anemia of convalescence, iron and arsenic preparations may be quite useful.

Infantile Scurvy

Infantile scurvy is an acquired hemorrhagic diathesis of infectious and toxic origin.

It develops in some infants and children who receive improper or spoilt food, which does not agree with them for a long period of time. It may develop in children at the breast.

Scurvy occurs most frequently between the sixth and fifteenth months. The usual sequence is a premonitory period of fretfulness, followed by anorexia and malaise. Then appear the tendency to hemorrhage, as shown by bleeding gums, subperiosteal and epiphyseal hemorrhage—especially in the legs, which are therefore discolored and tender on pressure. In long-standing cases there may be bleeding from the kidneys, and eventually emaciation and anemia.

Clinical Varieties.—So far as early recognition of the disease is concerned Morse recognizes three groups:

1. Commonest of all we have a class which elicits great tenderness—and in particular of the legs—when handled.
2. It may be recognized by swollen and bleeding gums.
3. A less frequent class is marked by hematuria.

Prophylaxis.—When bottle-fed infants show constipation and dyspeptic symptoms, they should receive a daily enema and live out of doors as much as possible.

If dyspeptic symptoms persist, a readjustment of their food is in order. Essence of pepsin and dilute muriatic acid may be administered. Orange juice and water in which unpeeled potatoes have been boiled are also of value.

Hygiene of the mouth is also important.

Treatment.—As soon as symptoms of scurvy are noticed bottle-fed children should be fed on *modified clean raw milk,* or if possible, breast milk, in the case of young infants.

Fruit juices have also a specific value. Orange juice in daily amounts of one to four ounces, in divided doses, is a common method of procedure, although the juice of a lemon or pineapple can be given. Fresh beef juice and baked potatoes are also said to have antiscorbutic value in treating these infants.

Medicinal measures have little effect during attacks. Hygiene of the mouth, as considered under Adult Scurvy, should not be neglected. Fresh air and sunshine must be provided. Even in intestinal catarrh, fruit juice is not necessarily contra-indicated, as improvement often follows if caution is used in its administration. Bowel washing can be recommended. The swollen and tender extremities can be wrapped in cotton and be further protected by splints. Under dietary treatment it is surprising how quickly these subperiosteal hemorrhages disappear. For the anemia of convalescence any of the popular inorganic forms of iron, such as the syrup of the iodid, are required.

In severe scurvy blood injections are called for.

Polycythemia Rubra

Erythemia

Symptoms.—This is a condition of adult life characterized by cutaneous cyanosis and spleen enlargement. The blood is pathognomonic and shows an approximate increase from 8,000,000 to 12,000,000 reds, with some relative increase of white cells. Hemoglobin is above 100%.

Besides the cyanosis and pain due to splenic enlargement, patients complain of headache, slight dizziness, epistaxis and hemorrhage from the skin and internal viscera. High blood pressure is usually present.

As the etiology of the condition is obscure patients should be carefully and repeatedly examined to find a cause for the condition even if the first examination reveals none.

Treatment.—*Venesection* often gives relief. Amounts of about 250 c.c. of blood are usually withdrawn. *Saline purges* are useful. The application of the x-ray to the spleen and long bones has been recommended, as in leukemia. Thus the ray is used as a two-edged sword inasmuch as polycythemia is said to be due to exaggerated functioning of the bone marrow. Other observers report that the x-ray finally increases the growth of the spleen.

To reduce the number of red blood cells we can cut out from the daily regimen the foods rich in purins and iron; this measure is often followed by improvement.

General hygienic measures are of value.

Splenectomy is ineffective and dangerous because of hemorrhage, and should therefore never be suggested.

Septicemia—Pyemia—Toxemia

Septicemia is a term used to describe the invasion of the circulating blood and body tissues by morbid bacteria and their toxins through some open or concealed focus. In *pyemia,* in addition to the bacterial invasion, there is a development of multiple foci of suppuration. *Toxemia* refers simply to the absorption and diffusion of bacterial toxins.

As parts of a general infective process, all three are marked in common by symptoms of nausea and vomiting, rapid pulse, restlessness, chills, pyrexia, and perhaps delirium. Fever is present in all but the gravest cases; any temperature of 101° F. or above appearing thirty-six to seventy-two hours after an injury to the body tissues, be it accidental, obstetrical or surgical, must make us consider the possibility of the presence of bacterial infection.

Toxemia of pyogenic origin, perhaps the least serious, usually disap-

pears after the primary focus of infection is opened, cleansed and drained.

Pyemia is usually characterized by fever of the intermittent type (103° to 105° F.), associated with rigor and sweating. Infective emboli are carried through the blood vessels where they may lodge, forming thrombi, or to various organs—such as spleen, liver, lungs, etc.—to form abscesses.

In septicemia, which is considered a very serious condition, all the symptoms of toxemia are present with remittent or intermittent fever. Prostration, jaundice and petechial hemorrhages may be present. Incision and drainage of the primary wound usually does not avail. Repeated blood cultures may be necessary to reveal the presence of organisms.

Prophylaxis.—Hygienic living, hygiene of the mouth and nasopharynx and asepsis in wound treatment are found to be rational preventive measures. Cleanliness, both personal and of environment, have much to do with the prevention of infection; furthermore, all that goes to keep up the general health acts in the same direction. The reasonable care of small wounds is also an important item. Hermetically sealing wounds with collodion is a bad practice. Washing with peroxid and the application of clean dry dressings, unless the contamination has been great—when wet antiseptic solutions should be substituted—are proper procedures. Infected puncture wounds should be laid open. In all wounds, foreign bodies and new viable tissue fragments should be removed.

Treatment.—The procedure for all cases is almost identical. The foci of infection should be sought for by repeated and thorough examinations, if necessary. Whenever possible these foci should be opened, cleansed and drained.

While we are concerned for the present mainly with pyogenic infections, even here the importance of bacteriological and serological tests as well as blood culture examinations is not to be overlooked. The best time to discover bacteria in the blood is during or directly after a chill. The blood should therefore be drawn at the appropriate time under aseptic conditions. The findings of the blood culture can be compared with the bacteriological findings at suspected primary foci and thus checked up.

To attack bacteria already in the circulation we must go back to the first indication—discover the portal of infection—and keep it as clean as possible by the usual measures.

Often the focus remains obscure, or the virulence of the invading bacteria overwhelms the patient, or the immunity of the individual is below par. In this connection the daily intravenous injection of 5 c.c. of 3 per cent collargol for five or six days has been recommended; also the sterile intravenous injection of 20 grains of magnesium sulphate in 200 c.c. of water. Highly diluted solutions of iodin or formalin are also used in like manner and neosalvarsan or salvarsanized blood serum may be helpful.

Probably the safest measure, especially in cases of impending collapse, is the injection of a pint of normal saline administered intravenously or by hypodermoclysis. Enteroclysis by the use of tap water is also beneficial.

The innate defenses of the body organism—phagocytosis and antibody formation—may require stimulation. This is accomplished by *sera* of bactericidal power or by *vaccines*. The use of antibacterial sera will be discussed in greater detail elsewhere in this volume; on the whole results leave much to be desired. When they are successful they confer a passive immunity upon the recipient.

It is essential to have a precise knowledge of the offending organism. An antistreptococcus serum has been given a trial in the treatment of septicemia and pyemia, but the results have not been so good as in meningitis, diphtheria and tetanus. They do no harm when used fresh. Vaccines are ineffective in acute conditions, but autogenous varieties can be recommended in chronic cases of low virulence. Sensitized vaccines have not given better results than plain vaccines.

The use of *blood transfusions,* particularly in toxemias of unknown origin, has been reported as helpful. Blood from an immunized donor may be transfused if the offending organism is known.

The *general treatment* is very important and comprises good nursing, fresh air, diet and the treatment of complications. Plenty of fresh air and sunshine are necessary. If the weather is warm and favorable the *bed should be moved to the roof.* Patients are better off in the hospital than at home. Rest in bed, frequent alcohol rubs and occasional changes in position, to prevent bed sores, and all that is implied by good nursing should be employed.

The diet must be fluid or soft in character and as plentiful as possible; frequent small meals are best. Milk, eggs, cereals, junkets, meat juices and broths are serviceable. *Alcohol* in the form of brandy, whisky, sherry or port, champagne—about an ounce, t.i.d., has the indorsement of many years of use as a stimulant. Some have claimed it to be a food, although recently this view has been vigorously combated. Some German investigators have observed that it inhibits antibody formation in the blood.

A glass of *water* should be given every two hours to insure thorough flushing and elimination throughout the body. Water can also be administered by the *Murphy drip method.*

In cases of extreme prostration or collapse or other conditions where it is not feasible to give food by mouth the patient can be tided over the crisis with the help of a *10 per cent glucose solution* administered by enteroclysis; a quart of the solution is generally used flowing at the rate of a drop per second.

For stimulation of depressed cardiac or respiratory function there are few more valuable drugs than *camphor.* It is given hypodermically (gr. v) in sterile olive oil every four hours. The use of camphor is somewhat

empirical, inasmuch as its action on the vasodilators and respiratory function does not explain the apparently beneficial effect on the heart. Its action does not persist very long, but alternating with spartein (gr. ii, q. 4 h.) or digipuratum, cardiac failure can often be warded off for an appreciable interval.

Another useful measure is the intravenous administration of a pint of normal saline with a few drops of *adrenalin* (1 to 1,000) added.

Fever is treated most safely by *hydrotherapy*. When the fever reaches 103° F. or above the patient should be sponged with tepid or cold water. Friction should invariably accompany cold immersion to help insure a healthy reaction.

For sleeplessness we can often rely upon hydrotherapy. *Bromids* may be prescribed but are usually not very efficient. *Morphin* is invaluable in this connection; moreover, it stimulates heart action.

Vomiting is often an annoying complication. Food should be of a digestible variety or predigested. Milk is better borne when diluted with lime water or coffee. Tincture of iodin in drop doses will often check vomiting; bromids may also be prescribed. Thorough catharsis often helps. In a certain number of cases the stomach must be washed out. Vomiting may be reflex through disturbance of function of some internal organ. Vomiting usually subsides when the toxemia is overcome. Should the patient's general nutrition suffer, *glucose solution* (one dram) to the pint may be administered per rectum, as before described.

For abdominal distention the introduction of a rectal tube often suffices. Colon irrigation may be necessary. Turpentine enemas or an injection of physostigmin salicylate can be tried if the former fails.

The anemia of convalescence is best treated hygienically and dietetically by meat juices, etc.

In pyemic conditions the same principles of treatment should be observed as in the treatment of septicemia. The primary focus should be cleansed and drained so as to diminish or prevent further infection of the blood stream. Thrombosed veins which are adjacent to the site of infection may have to be ligated and cleaned out. Ligature of the pelvic veins and even the lower vena cava have been advocated and successfully practiced in puerperal septicemia. Some surgeons regard the idea of ligature as fanciful; they look askance at the possibility of even localizing a thrombus.

Affected extremities may have to be amputated if infection has proceeded to such an extent that the life of the patient is threatened. Otherwise in osteomyelitis the shaft of the bone can be scraped and drained. When an isolated thrombus occurs in a large vein in an extremity, the limb must be immobilized and elevated. Hot fomentations may be prescribed. No massage is to be allowed.

Puerperal Sepsis

This variety of infection may be local or systemic in character and is due to the invasion of morbid bacteria by way of the birth canal during labor or the puerperium.

Like other wound infections, it may be manifested simply as a *local process,* in which case the infection is not serious. Vaginal discharge, tenderness, redness and perhaps swelling may be present.

If general in character, it is quite serious and manifests itself as septicemia, toxemia and pyemia. Therefore nausea, vomiting, jaundice, skin disturbances, accompanied by prostration, increase of pulse and respirations are characteristic symptoms. The latter take about three days to develop, although this varies with the incubation period of the organism involved. Tenderness over the site of the fundus may be present. Lochial discharges are often malodorous and decreased.

Prophylaxis.—In the last few weeks of pregnancy intercourse should be forbidden because of the possibility of conveying infective bacteria by the penis.

Except in gonorrhea or vaginal fistulae cleansing douches should be forbidden immediately before or after labor. Clothing and bedding should be clean and fresh. Instruments must be sterilized before using. The vulva and perineum should be scrubbed and sterilized and kept so as nearly as possible by means of special sterilized towels—the same as for surgical operations. Even in manipulations during or towards the close of pregnancy daily vaginal douches, with 5 per thousand lactic acid in water, has the effect of transforming pathologic vaginal secretions to the normal type.

During labor sterilized gauze wipes are necessary. The bowels should be emptied before the second stage of labor; thus we can avoid soiling the field. The medical attendants must be scrubbed as in ordinary operating room procedure. Plenty of warm lysol solution should be available. The patient's room should be warm, sunny and well ventilated. The placenta should be examined to make sure of its complete expulsion.

Treatment.—When a rise of temperature is encountered it is well to eliminate more common causes before suspecting the presence of puerperal sepsis. Fever is frequently due to mammary abscess, malaria, constipation, pyelitis, typhoid and phlebitis, although the latter is usually due to infective processes in the pelvis. After these are eliminated we can assume the presence of sepsis and can set about locating the portal of entrance; the exact determination of the latter is frequently difficult.

If a fetid discharge is present the vagina should be cleansed, and this is accomplished by using hot boric (3 per cent to 4 per cent) or bichlorid (1 to 2,000) douches. The use of the latter should be supplemented with

the use of warm normal saline douches. These procedures are quite effective where lesions are localized in the vagina or lower genital tract. If the temperature still persists after twelve hours, probe into the uterus, remove the placental remnants if present with gloved fingers, and follow by hot uterine douches of normal saline with a sterile douche nozzle. If there still results no fall of temperature we must look for collections of pus in the tubes, uterine wall, etc.

The treatment, of course, is then surgical—incision and drainage. Removal of the entire uterus is seldom indicated. In these cases of persistent temperature we should be on our guard against complicating infections, such as acute miliary tuberculosis, diphtheria, etc. Blood cultures should be taken. Thus arises the question of *sera* and *vaccines*.

Sera, in such cases, are of more benefit than vaccines; the latter are more effective in subacute or chronic conditions. The most successful is the antistreptococcus serum which registers successfully in sixty per cent of cases, provided the streptococcus is the actual invader. It should be given early. Doses of 100 c.c., every six hours, are required for effective results. In addition to the antistreptococcus serum, the administration of 5 to 6 ounces of human blood serum subcutaneously is advised. Other bactericidal sera used up to the present time have not yielded encouraging results. The use of *blood transfusions* and injections of *human blood serum*—especially the latter—have often been of benefit in the treatment of puerperal septicemia. Intravenous medication, as in *septicemia,* may be advisable. Hiss' leukocyte extracts have been employed subcutaneously. Blood from an immunized donor may be transfused.

The general treatment is otherwise the same as in septicemia. Diet should be light and stimulating. The various sequelae and symptoms of septic infection, such as bedsores, arthritis, peritonitis, pleurisy, pneumonia, etc., will require attention.

Before leaving the subject of septicemia, it may be mentioned that great reliance has always been placed upon *alcohol* in the form of whisky or brandy, in amounts of one-half an ounce, administered every three hours. *Strychnia* (gr. 1/30, q. 2 h.) is similarly employed. The two drugs can be given alternately.

In pyemic conditions of puerperal character, phlebitis of the uterine and pelvic veins is quite common. Disinfection of the uterus should proceed most carefully because of the possibility of disturbing sloughs. Incision and drainage of metastatic abscesses, if possible, and absolute rest and stimulation, the same as in other pyemias, may be necessary.

In *phlegmasia alba dolens,* which is a related form of infection due to thrombus formation, either leg is involved, and usually in the popliteal region. There are two forms, a *thrombotic form* and a rare, severer *cellulitic form.* The latter is due to the extension of a pelvic cellulitis which eventually sets up an inflammation of the veins. The treatment

consists in elevation of the leg and the application of an ice bag over the affected vein. The limb may be kept soaked in alum acetate solutions. Painting the affected area with ichthyol has also been recommended. The limb must not be moved or massaged for ten days after the temperature falls, so as to avoid the possibility of starting an embolus through the circulation.

Oral-Sepsis

This subdivision of general sepsis refers to those conditions of subinfectious character which have their portal of entry in the mouth—usually the teeth. They may result in pathologic changes in the various tissues and fluids of the body.

While patients may be absolutely unaware of any trouble at the oral focus, such as toothache, etc., the infection may cause symptoms of a mild secondary toxemia and a selective action on any of the following:

I. The tonsils, nasopharynx or larynx, and even bronchi.

II. Lymph glands. Submaxillary and cervical lymph glands are frequently involved. Disturbances of the glands of internal secretion, e. g., thyroid, have been traced to infective foci in the mouth. Parotitis may occur.

III. Through the mouth, via the intestinal tract, pus is carried to the stomach and intestines where it may interfere with function—gastritis, gastric ulcer. After absorption from the surface of the tract it may interfere with the functions of the liver and pancreas.

IV. Through the circulation organisms and toxins may be conveyed, causing arthritis, endocarditis, nephritis, neuritis, hemolysis and anemia.

Prophylaxis centers in oral hygiene.

Treatment.—Whenever any of the foregoing manifestations of low grade sepsis are encountered, it should be the rule to make a careful examination of the mouth and teeth. Tooth sockets should be carefully examined for pyorrhea. The roots of the teeth should be carefully examined for cavities and alveolar or apical necroses. Fistulae, sepsis of the pulp and periosteal abscesses should be watched for. Therefore no examination can be considered complete without an *x-ray* picture of the roots of the teeth. It is surprising what the latter may often reveal. It is well also to examine the secretions of the salivary ducts which may convey infectious bacteria to and from the salivary glands. Organisms from the mouth often invade the crypts of the tonsils. But at this time we are mainly concerned with the incursions of the bacteria into the cavities of the teeth. Here they are subjected to low oxygen tension which ultimately will result, as Rosenow has shown, in a transmutation of species having themselves or by their toxins a special and selective action on the synovial membranes of the joints, endocardium and kidneys. The absorption of

the toxins of these bacteria may result in hemolysis of the blood and anemia.

To overcome these insidious infections the importance of thorough examinations of the mouth is obvious. To secure this we must have good x-ray films and a skillful dentist who can apply the proper reading. Surgical treatment of the focus is therefore primary. This consists either in actual extraction or some other means of surgical eradication of the infective focus.

Vaccines are of secondary importance and should be used only in conjunction with surgical extirpation. They should be *autogenous* and can be isolated from the pus cavity under a special aseptic technic, the danger of contamination being great.

So far as the pyorrhea is concerned it is not of itself a separate bacterial infection. The best treatment is surgical and involves the extraction of badly damaged teeth. Mouth washes of hydrogen peroxid and boric acid are effective. Injections of *emetin* are employed and are said to be followed by marked benefit in amebic pyorrhea.

Cryptogenetic (Focal) Infections

These refer to obscure foci *anywhere* in the body which produce infections of low grade character. Just as in the case of foci in the mouth, they affect the body tissues producing arthritis, endocarditis, neuritis, myositis, anemia, etc.

Portal of Entry.—In tracing the portal of entry of an arthritis, endocarditis, or other low grade infection, we should make a careful and systematic examination:

Eye.—Inspection of the meibomian and lacrimal glands and tear duct.

Ear.—Mastoid or middle ear involvement should be eliminated.

Throat.—This includes an examination of the tonsils, of the pharynx for adenoids, larynx, postnasal sinus and the nares, particularly in respect to the condition of the various sinuses and turbinates.

Lungs and Bronchi.

Gastro-intestinal Tract.—A close inspection of the various portions with special reference to the gall-bladder and appendix.

Urogenital System.—This includes a survey of the uterus, ovaries and tubes in the woman, and of the prostate, seminal vesicles and urethra in man, and the kidneys and their pelves, ureters and bladder (in man and woman).

Other Body Recesses.—These should be included.

Treatment.—This consists, to be sure, in the radical removal of the cause—whether it be the appendix, the gall-bladder or tonsils. And in this connection it should be stated that the tonsils, which are a frequent source of trouble, are best treated by absolute removal—tonsillectomy.

Vaccines alone are quite useless, but hand in hand with vigorous local treatment at the portal of entry, they produce good results. The autogenous variety is by far the best. The results from blood cultures should be used to check up the identity of organisms isolated from the focus. This is often a difficult matter and special technic, such as that devised by Rosenow and Billings, may be necessary.

Diet and good hygiene are also important.

Lymphatic Derangements

General Remarks

Lymph is a transudate of the blood through the capillaries. It gets to the parenchymal cells laden with nutrient material and eventually carries

FIG. 61.—LOCATION OF THE PRINCIPAL LYMPHATIC GLANDS OF THE NECK. (After Campbell-Kerr, "Surgical Diseases of Children.")

FIG. 62.—LOCATION OF THE PRINCIPAL LYMPHATIC GLANDS OF THE TRUNK. (After Campbell-Kerr, "Surgical Diseases of Children.")

away certain products of metabolism which it returns to the circulation. The lymphatic glands also serve as a filter against infection.

The composition and quantity of lymph must be different in different parts of the body and in accordance with the needs of the part. Difficulties in the transit of lymph through the capillaries, if they exist, are not recog-

nized clinically. The clinical interest centers in the accumulation of lymph in spaces and cavities. The pressure in the lymph system is dependent upon arterial pressure and is modified by the counterpressure offered by the various tissues.

Fig. 63.—Tuberculous Adenitis Showing the Marked Enlargement Which May Sometimes Take Place Without the Glands Breaking Down. (After Campbell-Kerr, "Surgical Diseases of Children.")

Lymph Stasis.—Lymph canals may become obliterated or dilated (*lymphangiectasis*) or become inflamed (*lymphangitis*). When the superficial lymphatics are blocked, the skin is covered with blebs or vesicles. We see this condition occasionally on the scrotum or vulva. Dilated lymphatics may be present as distinct tumors (lymphangiomas). The massive tongue (macroglossia) is an illustration of the hypertrophic condition of tissue from lymph stasis.

In lymph stasis the part is rough and thickened and resembles edema but does not pit on pressure. Lymph stasis may be distinguished from venous obstruction by its pinkish rather than its cyanotic appearance.

Treatment.—As regards treatment little else than elastic pressure or incision can be suggested.

Lymphangitis

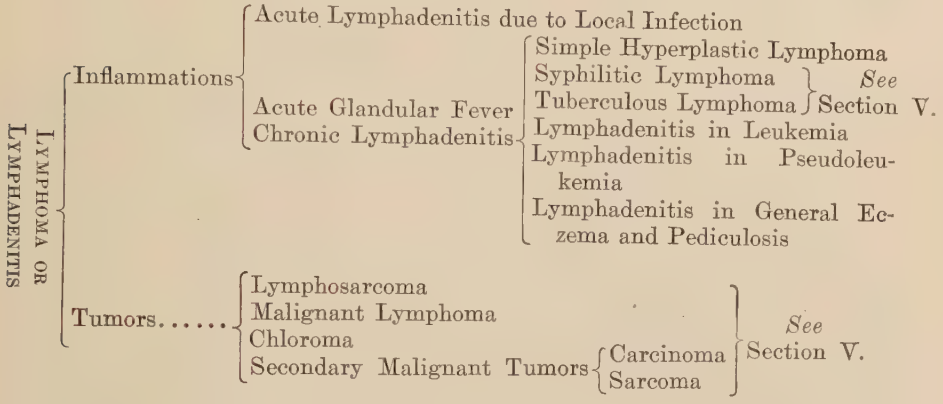
Inflammation of the lymph vessels is associated with swelling or inflammation of the lymph nodes, and is due to infection. Lymph nodes hold up the infecting material and become swollen and inflamed themselves, such infection terminating in resolution or pus formation. Occasionally septic products appear to pass or escape the glands, and general sepsis or blood poisoning ensues.

Symptons.—Red lines run from the wound to the nearest lymphatic glands. The parts are painful and tender. The patient may have in addition chills, fever, vomiting, and diarrhea.

Treatment.—Treatment should consist of moist antiseptic dressing to the portal of infection, with elevation and rest of the affected part, a cold lead lotion or hot fomentations to the inflamed parts, and the free use of the knife to allow of the escape of pus or seropus, should it form.

Lymphadenitis

The following diagram will aid us in our conception of the term *lymphoma* or *lymphadenitis:*



Acute Lymphadenitis

Acute lymphadenitis is treated by applying cold (ice bag) or heat, by the hot-water bag or a poultice. Incision or excision may become necessary. The glands in the neck, axilla, and groin are the principal glands to suffer infection. An acutely inflamed gland may be ready for the knife in a short time. On the other hand, there are cases of subacute intensity with circumglandular induration and swelling and semifluctuation which require surgical interference before abscess formation. If for any reason whatsoever it is not desirable to enucleate such glands, a free incision extending through the capsule of the gland may be made and the latter broken up by manipulating with a blunt dressing forceps or

Fig. 64.—Abscess Pointing in Front of Upper Part of the Sternomastoid (Dowd).

by scraping with a sharp spoon, after which the wound must be kept open under a moist bichlorid or iodoform dressing. Such manipulations are painful and should be done under anesthesia. A superficial and accessible glandular abscess may be cut open without anesthesia, provided the patient will hold or can be held still. Bier's Suction Treatment is frequently used with success.

Subacute and Chronic Lymphadenitis

In *simple hyperplastic lymphoma,* an affection which is found in many instances in children in the first decennium of their lives, as the result of a chronic peripheral irritation, such as eczema, nasal or pharyngeal catarrh, hypertrophied tonsils, adenoids, carious teeth, etc., the glands are comparatively small, painless, and movable, and they show no tendency to break down.

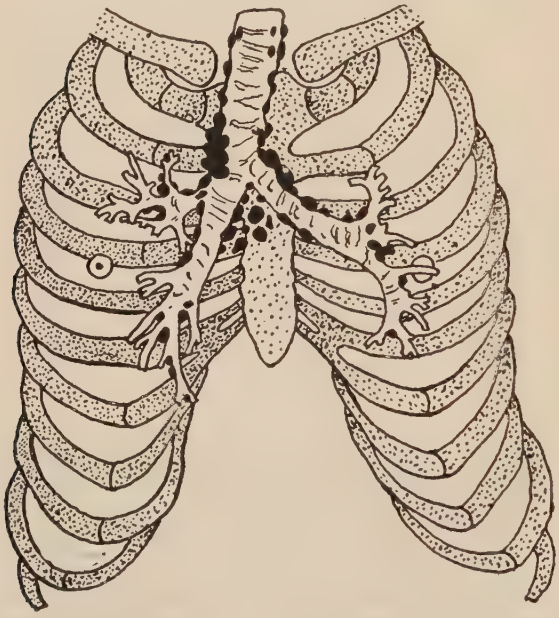


Fig. 65.—Peribronchial Lymph Nodes; Anterior View (Lucas).

The glands most frequently affected are the cervical, axillary, peribronchial and periesophageal (mediastinal), mesenteric, and inguinal. Whenever we meet with enlarged lymph nodes we should endeavor to seek the cause or portal of entrance of the infecting and irritating agent. Occasionally the primary focus has cleared up, but the gland remains enlarged, and in some cases glandular enlargement accompanies anemia and malnutrition without any appreciable local source of irritation. Cervical and mediastinal lymph nodes are readily infected from the buccal cavity, the nasopharynx, the bronchi and esophagus; the mesenteric and inguinal glands are infected from the intestine and genito-urinary tract.

Tuberculous Lymphomata.—The glands vary in size from that of a pea to that of an egg. Tuberculous lymphomata are most frequent in the second and third decennia. Another point quite characteristic of tuberculous lymphomata is the presence of packages consisting of a number of glands of different sizes which are connected. Tuberculous glands may be freely movable or more or less fixed. In one case the tuberculous process

is entirely intraglandular and in the other case it has extended to or beyond the capsule, causing this latter to react by an inflammation with the production of thickening of the capsule and its attachment to the surrounding parts. In the one case you have the tuberculous process without peri-adenitis, in the second case with peri-adenitis. The presence of scars shows that the tuberculous process has gone even one step further, viz., to the formation of abscesses.

When a tuberculous abscess, after its formation within a lymph node, comes to the surface, it does so by perforating the thickened capsule through a small fistulous opening and by emptying itself into the subcutaneous connective tissue, lifting up the skin and forming a subcutaneous abscess. Afterward the skin breaks at some point, fistulae with fungous granulations result, which take a long time to close. From the complicated shape of the abscess cavity—partly intraglandular, partly subcutaneous—and the long duration of the discharge, it can readily be understood why the tuberculous scars always have a characteristic irregular shape, never linear and smooth, usually drawn out in radiating lines, showing retractions and prominences, and becoming adherent to the underlying parts.

Syphilitic Lymphomata.—Syphilitic lymphomata occur in all three stages of syphilis. In the first stage we find large, painful glands adjacent to the infected region, with a history of recent origin.

In the secondary stage of syphilis we find small nodes, not larger than a bean, in almost all parts of the body where glands are found; they are painless, freely movable, and never break down. Gummata of the glands, found in the third stage of the disease, are rather rare. They grow slowly, are painless, have a firm, elastic consistency, and average about the size of a walnut. At first they are not adherent; later, as the gumma breaks down, it becomes adherent to the skin, breaks through and forms the characteristic syphilitic ulceration.

Malignant Lymphomata.—They are, in an early stage, often indistinguishable from tuberculous glands, appearing, as they usually do, at first one side of the neck as numerous nodes of moderate size, about that of a bean, but without any peripheral lesion being found. Later on, however, they increase steadily in size and number, some of them growing to the size of an apple, displacing and compressing the neighboring organs. They never break down, never invade the capsule, and never form adhesions with the surrounding parts. Death results from increasing weakness or from pressure upon important organs.

Lymphosarcoma occurs as a single tumor always, which rapidly grows and invades the neighboring parts, becoming fixed.

Of secondary malignant tumors it will suffice to say that they follow in the course of primary malignant tumors, are at first freely movable, and later become attached to the surrounding parts.

Treatment.—Lymphadenitis without abscess (simple hyperplastic lymphoma) requires treatment only of the original site of infection; syphilitic glands never require surgical treatment, except some cases of broken down gummata; malignant lymphomata turn out fatal, even where the most painstaking attempts at thorough removal are made; lymphosarcomata are capable of removal only in the earliest stage of their development. Secondary malignant tumors of course should be removed if possible, but that is usually done when the operation for the primary carcinoma is performed.

Tuberculous lymphomata, however, very frequently require surgical treatment. By no means should all cases of tuberculous lymphomata be operated upon. A great many patients may get well without operation—especially children — by placing them in the best possible surroundings, giving them good nourishing food and tonic and specific treatment. (*See* chapter on Tuberculosis.) We may even say that there is no stage of the disease in which a spontaneous cure is impossible. Bier treatment is often of great value.

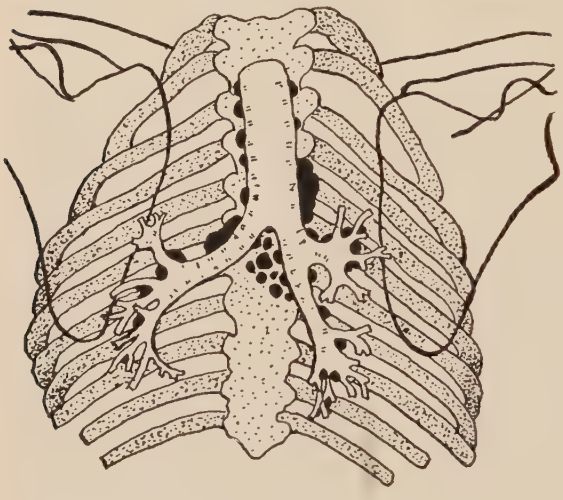


Fig. 66.—Peribronchial Lymph Nodes (Lucas).

This favorable outcome is of course most likely to occur in the earliest stages of the disease, in those cases where the glands show only a hyperplasia, with perhaps a few tubercles scattered through their substance. But even cheesy foci may become encapsulated, abscesses may discharge until all the necrotic portions of the gland have been thrown out, and the process thus terminates in a cure. If, in spite of prolonged general treatment, the glands continue to increase in size, or if they break down and form abscesses or fistulae, the indication for surgical treatment is given.

For cosmetic reasons a method of conservative surgical treatment has been devised to obviate making incisions by injecting certain substances into the tuberculous lymphomata or abscesses. For this purpose a 5 to 10 per cent emulsion of iodoform in glycerin or oil is commonly used. Chlorid of zinc and other chemicals have also been employed. These methods are to be recommended only in cases where there is but a single tuberculous lymph node or abscess.

The preferable treatment is either by incision and scraping out or extirpation, the former in cases of abscess with fistula, the latter for more or less solid glands. In the submental region the incision is usually made from the chin to the hyoid bone; in the submaxillary region, parallel with the horizontal ramus of the lower jaw; in the supraclavicular region, by an incision parallel to the clavicle; in the sternomastoid region, where the glands are found most frequently, by incisions in front of and behind the sternomastoid muscle. These incisions will usually give sufficient room, but if necessary the muscle should be divided transversely, in order to give more room, and be reunited at the end of the operation. The wound is then sewed up and a drain inserted at the bottom.

In cases without peri-adenitis the operation is quite simple, the difficulty increasing in direct proportion to the amount of peri-adenitis and requiring in many cases very delicate dissection to free the glands from the important structures of the neck.

Syphilitic lymphadenitis usually responds to specific treatment. (*See* chapter on Syphilis.)

The treatment of leukemia and pseudoleukemic lymphadenitis is that of its underlying blood condition.

Bier's Hyperemia (*Suction Treatment*).—This form of treatment, which is described in Section I (p. 83), and in the article on Glandular Tuberculosis (page 320), is applicable to most cases of acute and chronic glandular inflammation.

Vibration may also be used to advantage in acute and chronic lymphadenitis.

Good hygienic management is essential in all forms of adenitis.

Blood, Serum and Vaccine Therapy

1. Blood Therapy

In recent years this form of therapy has received great impetus. Improvements in the technic of administration are constantly being devised, and while some of the procedures to be described are quite simple as compared with those in vogue a few years ago, the writer feels there are still complexities which will be eventually overcome. The administration of blood should partake of no more difficulty than that attending the administration of a saline infusion.

Transfusion

Transfusions are direct or indirect.

Direct Type.—In the direct type the blood flows continuously from the donor to the recipient. An artery, e. g., the radial, is dissected out from the arm of the donor which has been rendered surgically sterile. The adventitia of the artery is stripped back and a warm saline compress

is applied. The arm of the recipient is now constricted to make the superficial veins as prominent as possible, and a conveniently large one is dissected out; it is cut longitudinally and each side caught with a mouse-tooth forceps. The artery of the donor, after being divided transversely, is joined by its proximal end, in an invaginated fashion, to the exposed vein of the recipient, the walls of which vein are folded over the donor's artery by crossing the mouse-tooth forceps over each other. The artery or the vein—if that be chosen—of the donor can be joined to the exposed vessel of the recipient by suture or by cannula instead of invagination, but in any of the three it is always a matter of difficulty to avoid clotting. Exquisite technic is always necessary by this method. In addition, the actual amount of blood transfused cannot be determined exactly. Failure attends its use in many instances. For these reasons direct transfusion is little used at the present time.

Indirect Type.—In the indirect type the blood is drawn from a suitable vein of the donor and injected into the recipient. It is the method of choice, having been found eminently more simple and efficient. There are several methods.

Probably the simplest procedure is the *injection of whole blood beneath the skin.* By means of a 20 c.c. Luer syringe blood is withdrawn from a parent or other suitable donor by a medium-sized aspirating needle and injected subcutaneously. Blood clots are always absorbed in from two to ten hours. The method is applicable in marasmic or premature infants, also in the hemorrhagic diathesis of the newborn. It is also used in adults in conditions of pneumonia, empyema, hyperthyroidism, neuritis and anemia. It is quite useful when the more elaborate procedures are not available for lack of time and in infants.

Somewhat akin to this method are *hypodermic serum injections.* The technic consists of simple venesection, as in obtaining blood for a Wassermann test. Dr. J. E. Welch uses a simple apparatus consisting of a sterile flask, with a rubber cork which has two perforations. Through one perforation passes a U-shaped glass tube, to the outer end of which is attached a rubber tube and sterile aspirating needle, No. 19. Through the other perforation is inserted a fusiform glass tube by means of which blood is aspirated after puncture from the vein into the flask. After standing for some time the clot separates and the serum is ready for use. The serum must be that of *normal* human blood. The advantage of the use of serum lies in the fact that there is no possibility of hemolysis or embolism.

It has been found quite effective in stopping hemorrhages of infancy, purpura and hemophilia. In a certain number of cases it has been successfully used in streptococcus bacteriemia, including puerperal sepsis and other septic conditions.

In adults it is given hypodermically in doses of 300 c.c. over a period

of five days. In infants initial doses are 10 c.c. t.i.d., although 2 ounces have been given at one time and absorption always followed.

The *syringe and cannula method* has been attended with good results in the hands of Dr. Lindemann. His apparatus consists of two nests of aspirating needles and about fifteen of the 20 c.c. variety of Record syringes. The outer needle of the nest of cannulas is dull, so as to avoid injuring the intima. The interior of the needles is lined with albolene. Lindemann inserts one of the specially devised nests of cannulas into a suitable vein of the donor and another nest into a similar vein of the patient. Thus there is no skin incision.

No syringe is used a second time until cleansed with saline. One operator manages the syringe of the donor, another that of the patient. One syringe is being filled while another is being emptied. A little saline is passed through the patient's cannula to avoid coagulation. The syringes are passed from the donor to the patient in rapid succession until the amount desired is transfused. Lindemann compares the action of the syringe to a human heart. It takes six to twelve seconds to fill and empty a syringe, but the coagulation time of normal blood is five minutes. As much as 1,500 c.c. can be transfused. This is a most successful method, but in so far as it requires an extensive apparatus and three surgeons, it still leaves something to be desired.

To obviate these disadvantages, Dr. Lester Unger has devised an ingenious instrument. It consists of a 20 c.c. record syringe attached to a cock which has four outlets: (1) blood outlet, (2) saline outlet, (3) recipient's outlet, (4) donor's outlet. Paraffined rubber tubes are attached to the last three outlets with trocar cannulas for the recipient and donor. By means of a central stopper, working as a ball valve, there is immediate and continued flushing with saline of that part of the system through which the blood is passing. This method is gaining popularity and is used in some of the largest hospitals in New York City.

To prevent intravascular injury, which results in the furtherance of clotting, as well as external clotting, Satterlee and Hooker introduce an *outside cannula* through the donor's vein which is exposed through a small skin incision. Then a second cannula is introduced further into the vein so that no blood near the point of injury is received. Then the blood is passed into a large paraffin-coated graduated glass receptacle. To this hirudin (leech venom) is added—,004 gm. to every 220 c.c. Sodium citrate in proportion of 0.2 per cent is also recommended for inhibition of coagulation. In the selection of a donor we must consider two things. He must be free from disease. Therefore a Wassermann test should be done among other tests. In the second place we must, by the proper laboratory technic, determine that the foreign blood of the donor will cause no hemolysis or agglutination.

There is still much to learn about the rational application of blood

therapy. With Hartwell we can justly consider a transfusion of blood, a homologous transplantation of tissue.

The most brilliant results of transfusion are attained in cases of drastic hemorrhage. In diseases characterized by a tendency to hemorrhage—hemophilia, purpura or absence of necessary constituents of the blood, e. g., prothrombin and blood platelets, serum injections are sufficient here. If the loss of blood is large, extensive transfusions are best, the formed elements plus the serum being supplied.

Transfusions have often demonstrated their value in infections. This may be due to the renewed supply of antibody elements. Serum injections or transfusions have also been used with considerable success in preparing jaundiced patients for operations, in carbon monoxid poisoning, pernicious anemia, shock, malnutrition, secondary anemia, in poor surgical risks, postoperative cholecystotomy, tuberculosis and in cirrhosis of the liver.

2. *Serum and Vaccine Therapy*

To use this weapon with intelligence, it is essential for one to be acquainted with the fundamentals of pathogenic bacteriology and immunity. Lack of recognition of this fact has caused mistakes.

Toxins and Endotoxins.—Toxins are proteid products of poisonous nature, arising from activities of bacteria in the animal body. Diphtheria and tetanus organisms are examples. Toxins also cause the formation of antitoxins. Endotoxins are also poisonous protein products, but they arise from the destruction of the bacteria themselves in the body.

Immunity.—Vaughn defines immunity as the inability of the infecting agent to grow in the animal body. Whether this property is innate or acquired depends upon an elaborate defensive mechanism. It is a conflict between the toxins and enzymes of the bacterial invaders and the highly intricate forces of body resistance—partly enzymatic themselves, according to some observers.

The crux of the hypothesis of resistance hinges on the presence of antibodies in the blood serum. These neutralize toxins and destroy bacteria.

In the use of vaccine (bacteria) or serum treatment, we aim to produce an immunity. This may be passive or active. In passive immunity we throw the protective antibodies directly into the circulation. In active immunity we merely inject a suitable antigen into the body organism which within a few days or weeks produces by itself the proper antibody to overwhelm the invader. They are employed for purposes of prophylaxis, e. g., typhoid; preventing the full development of a disease, e. g., tetanus, rabies; curing diseases, e. g., diphtheria, acne, etc.

Antitoxic serum confers a passive immunity by virtue of its ready-made

antibodies which neutralize the exotoxins of the invading bacteria. Diphtheria and tetanus are examples.

Phagocytosis.—Phagocytosis concerns itself with the ingestion and intracellular destruction of pathogenic bacteria and their products by the leukocytes and other cells of the body. It is one of the important protective agencies of the body.

The details of Ehrlich's side chain theory, Wright's opsonic index and other hematological phenomena are not within the scope of this presentation, and should be sought for in works on immunology.

(a) Serum Therapy

Bactericidal Sera.—Bactericidal sera are those which abound in bacteriolytic antibodies and neutralize endotoxins. *Antistreptococcus* and *antimeningococcus sera* are of this variety. Complete success has not yet attended the use of this species of immunization.

Vaccines (Bacterins).—Vaccines are cultures of bacteria killed by heat, filtration or chemicals. The introduction of these by subcutaneous administration is designed to stimulate the formation of protective antibodies—active immunization. In an attempt to combine the advantages of sera and vaccines a variety of vaccines (sensitized vaccines) have been employed. These are bacterial emulsions which have been treated with immune serum *in vitro*. A decisive opinion of its value at present cannot be given.

Administration of Serum.—In general it can be stated that the use of sera in the domain of therapeusis is on a firm basis. They also have a prophylactic value. Whether antitoxic or antibacterial, the serum is obtained from the blood of the lower animals.

This fact brings us face to face with the question of anaphylaxis or serum sensitization. Some asthmatic individuals are sensitive to horse serum. These and certain other patients therefore cannot endure antitoxic or bacterial sera very well. To guard against such accidents, a few drops of the serum can be injected subcutaneously and an interval of an hour should pass before the regular dose is administered.[1]

The action of a serum is specific. Consequently the aid of the laboratory in making an exact diagnosis of the attacking organism is valuable. Bacterial examination of blood culture, cerebrospinal fluids, etc., should be made whenever indicated. Chances of recovery are retarded by the administration of an antiserum of a strain other than the one indicated; therefore polyvalent sera should be discarded. The protective action of sera does not endure very long but it puts no strain on the body organism, inasmuch as the immunity is of passive nature. A good, fresh serum is

[1] The treatment of anaphylaxis consists of the injection of atropin or adrenalin and artificial respiration, if necessary.

necessary to attain the desired results. It should be given in the acute stage.

Varieties of Sera.—Anticolon.—A practical failure as regards benefits.

Antidiphtheria.—A successful antitoxic serum discovered by Behring. Details of its administration are given in the article on Diphtheria. Recently Schick has done some valuable work in regard to the dosage. Massive doses are no longer given: 50 units per kilogram is a sufficient dose for prophylaxis. Depending on the severity of the infection, therapeutic doses range from 100 to 500 units per kilogram (2 1/5 lbs.) It is not necessary to give more than one prophylactic dose because by administering a dose of antitoxin we simply protect the individual from the toxin liberated after this dose. For the previous protection he has his own immunity to thank. It takes two days for antitoxin injected intramuscularly to become disseminated throughout the system.

Antidysentery.—An antitoxic and bactericidal serum from the Shiga-Kruse bacillus. In using this serum for prophylaxis the dose is 5 to 8 c.c., which becomes effective in eight days. For therapeutic purposes mild cases require one injection of 10 c.c. Moderately severe cases require a repetition of the 10 c.c. dose in six hours; very severe cases require from 40 to 60 c.c., but the daily dose according to Shiga should not exceed 20 c.c. The serum causes a decrease in the number of stools, tenesmus, blood, etc.

Antigonococcus.—Because of the different races of gonococcus present in these affections, a polyvalent serum would be most effective, but so far several such have been found wanting in results.

Antimeningococcus (Flexner).—A bactericidal serum. It is administered into the subarachnoid space by lumbar puncture in accordance with the usual technic. It must be given early. After drawing off as near 20 c.c. as possible, the same amount is introduced by the gravity method or very slowly with a record syringe. The serum is said to have markedly reduced the mortality and the duration of illness, but this is not conceded by all observers.

Antipneumococcus.—Neufeld of Germany and Cole of New York are doing pioneer work upon an antibacterial serum of four strains. The pneumococcus is so classified according to its agglutinating power.

Their theory is that one large dose of an active specific immune serum given intravenously can absolutely sterilize the blood during a pneumococcus infection. In order to identify the strain of the pneumococcus involved, a specimen of the sputum is sent to the laboratory, thereby involving a delay of from eight to twelve hours. Types 1-2-3-4 are to be looked for.

Doses of 50 to 100 c.c. of the pneumococcus serum are required and repeated in six hours if necessary. Results by this method, up to the

present time, are encouraging, but more testing is necessary before a positive opinion can be determined.

Antiplague Serum.—Antitoxin of a desirable strength has not yet been found; such as has been used is effective only for five days at most. In combination with vaccines the results are said to be good.

Pollantin (Dunbar).—An antitoxic serum concerning the value of which there is a difference of opinion. The pollen of certain grasses and other plants, e. g., golden rod and the ragweed variety in America, and certain grasses and grains (graminaceae) more common in Germany, contain a proteid poison. Horses are immunized against this toxin by subcutaneous injection. The serum is then prepared for therapeutic purposes in liquid, powdered or salve form. In any form it is applied to the mucous membrane of the nose.

Powdered pollantin is applied with a camel's hair brush to the nose and snuffed up. Sixty per cent of cases are successes and about twenty-five per cent are benefited.

Antistaphylococcus.—Thus far lacking in good results.

Antistreptococcus.—A bactericidal serum of debatable value which should be used early. In the late stages of an acute infection its use is attended with danger. In septicemia with true bacteriemia of streptococcus origin, whether puerperal, arthritic or endocarditic in nature, the combined used of antistreptococcus serum in the early stages together with the later use of autogenous vaccines can be especially recommended. The serum should be reasonably fresh and is given subcutaneously in doses of 50 to 100 c.c. and repeated once or twice.

Antitetanus.—An antitoxic serum of considerable value in prophylaxis. Any wound which has been in contact with soil, gunshot, fire or manure, should be suspected of harboring tetanus germs. Prophylactic doses can be given in doses of 2 c.c. at the site of injury or 15 to 20 c.c. subcutaneously. When symptoms have once developed—e. g., trismus—fixation of the toxins in the nerve cells has taken place and the antitoxin is deemed of no avail.

Autogenous Serotherapy will probably prove valuable, but the range of present usefulness is not very large because of the short duration of the acute stage of the ordinary infections. In Germany it has been used in typhoid with good results.

About 60 c.c. of blood is withdrawn and 5 per cent phenol solution is added to the serum, a drop at a time, up to 10 per cent. A daily subcutaneous injection of 3 c.c. is given until defervescence takes place.

(b) Vaccine Therapy

When time is not an important consideration, active immunization with attenuated or dead bacteria is available for almost every disease of

bacterial origin. Therefore in the department of prophylaxis, vaccine therapy is thoroughly established as a safe and useful procedure. In the department of therapeusis its achievements are not quite so brilliant. Only in the subacute or chronic stage of an infection should they be em ployed and then in combination with general and local treatment.

In the acute stage vaccines are contra-indicated, since overwhelming the body with additional antigen would be obviously harmful. Vaccines are usually given subcutaneously—preferably in the arm near the insertion of the deltoid. No two consecutive injections should occur in the same region within two weeks, because of the danger of damaging the lymphatics. Vaccines are occasionally administered by the *intravenous route*—rarely by mouth or rectum. The dosage depends upon the variety of the bacteria and the condition of the patient.[1] The more virulent organisms require smaller doses. The more acute cases require smaller doses and cautions increase.

Initial doses vary and a focal reaction should at least follow, namely, an increase of congestion and cellular activity at the focus of disease. The temperature and pulse should be taken before and after each dose. There is also some reaction at the point of introduction. An excessive reaction is shown by the presence of headache, malaise, slight fever, etc. Doses should not be administered more often than every five days. A course of injections should include about twelve doses. If benefit is being derived from the procedure an improvement or cure is manifest. After a rest of a month another course of injections can be attempted.

To be entirely certain, dosage in regard to frequency and amount could be figured out by the *opsonic index* devised by Wright, but in order to be accurate the technic ought to be performed by trained laboratory workers with special apparatus.

The opsonic index is a comparison of the phagocytic powers of the leukocytes of an infected patient as compared with that of a normal system. Vaccine injections cause at first a fall of the opsonic index because the introduced antigens use up all the opsonin present. This is the negative phase. Then ensues an increased regeneration of the opsonin element, thus establishing the positive phase. An increased immunity therefore exists—thus the discretion of not repeating vaccine injections in the first two days after an administration, because of the existence of the negative phase.

The use of *stock vaccines* should be limited as much as possible. Even if a correct morphological diagnosis of the invading microörganism is made, there still has to be considered the possibility of various strains of the same organism. To overcome these objections manufacturers have put on the market polyvalent preparations of various bacteria. To these

[1] Vaccines should be reduced for diabetics. They should be withheld from menstruating women. Very young children should receive one-fifth of the usual dose.

the same objections exist as in the case of polysera—that, even perchance one of the ingredients should be the proper antigen, the numerous superfluous antigens place a heavy burden on the protective mechanism of the body defenses. Therefore whenever possible autogenous vaccines should be used. We must be accurate in securing cultures from the lesions which are causing the trouble and to check up results by smear and blood culture if possible. Vaccines should not be inert; they must be without contamination.

The *phylacogens* are filtrates from cultures of some predominating microörganisms mixed with that of others. Their use has been condemned by many of the profession.

Inoculations of vaccines are either exogenous or endogenous. Exogenous inoculations are the ordinary introduction or injection into the body of bacterial suspensions (vaccines) and *endogenous* inoculation is *an auto-inoculation.* This phenomenon takes place in subacute or chronic tuberculosis, when a quiescent tuberculous process is suddenly stirred up by exercise, massage or passive hyperemia. This method of inoculation is said to be desirable when antibodies cannot penetrate the walled-off foci.

Tuberculin.—Original Tuberculin (O. T.).—Contains the toxins of tubercle bacilli.

Tuberculin Residuum (T. R.).—Koch's first new tuberculin. This is a centrifuged mixture which contains mechanically subdivided dead bacilli.

Bacillus Emulsion (B. E.).—Contains toxins and bacilli. It is the supernatant fluid containing O. T. and T. R. It has all the immunizing substance of the tubercle bacillus and is subjected only to heat of 60° C.

Deny's Bouillon Filtrate (B. F.).—This is a filtered solution like O. T., the bacilli being removed.

An emulsion of B. E. and B. F. is said to have the best immunizing power.

Tuberculin is used for diagnosis, immunization and treatment. Injections of tuberculin produce antituberculin bodies. The rationale of a tuberculin cure involves the production of toxic immunity, local hyperemia, raising the opsonic index, raising the agglutinins, producing first a leukopenia and then a leukocytosis, increasing fibrous tissue formation and hyperemia in the affected parts. Desirable patients are those in the incipient stages with little or no fever and who are fairly well nourished. It is indicated in children of tuberculous tendency and in recovered tuberculous patients whose progress is stationary, patients with unmixed infection, and patients who with increasing doses show no reaction.

The Dose.—The size of the dose and the interval is vitally important. For an initial dose of B. E. and T. R. 0,000001 gm. for afebrile patients and 0,0000001 gm. for febrile patients is recommended. For B. F. or

O. T. the initial dose varies from 0.0000005 c.c. to 0.000001 c.c. for afebrile, and from 0.0000001 c.c. to 0.000001 c.c. for febrile cases. To dilute tuberculin we use normal saline. The water and needles employed should be sterilized by boiling.

Doses at first are repeated every day or two, or twice a week, and later when larger doses are administered, but one a week; of course this depends on the reaction of the patient. While an attempt should be made to raise the dose tenfold each time, patients may have to be held at the same dosage for two or three administrations to watch for accumulative action. The duration of treatment ought to be at least five months and should be pursued at a hospital or similar institution.

Tuberculin is given hypodermically into the subscapular region or into the extensor surface of the arm. (*See* Section V.)

Symptoms of Overdose or Accumulation.—These are rise of temperature and pulse, sudden loss of weight, malaise, irritability, nervousness and insomnia, anorexia.

Prophylactic Vaccinations

Vaccine Against Smallpox.—The inoculation of human beings by cowpox, which is probably the attenuated form of smallpox, is so familiar and well established as scarcely to deserve mention. Small glass tubes containing sufficient glycerinated lymph of the virus for a single operation are widely dispensed. The label should register the time limit of its usefulness. An inert virus yields no satisfactory result. For the *technic* of vaccination with this virus *see* Smallpox.

Children should be vaccinated for the first time at two years. The custom is to vaccinate the child just before entrance into school. Adults require vaccination only when threatened by the proximity of an epidemic. "Takes" are signalized by the presence of a papule on the third day, by a vesicle with a raised margin on the fifth or sixth day, by an extensive areola on the tenth day, and after the second week by a scab.

Erysipelas should be prevented. Ulceration is treated with mild salves, such as aristol (1 per cent), ichthyol (5 per cent).

Vaccine Against Rabies.—The vaccine virus against hydrophobia has attained wide success for the purposes of prophylaxis.

Lack of exact knowledge of the etiological organism of rabies leaves us in the dark as to whether the immunization is active or passive in character. The virus is not of value once the disease is actually started on its course.

Wounds in the face and head are especially dangerous and call for administration of the virus as soon as possible.

The *technic* of antirabic treatment is fully discussed in the article on Rabies.

Vaccine Against Typhoid.—This vaccine has been found a most serviceable prophylactic measure, especially in conjunction with efficient hygiene and sanitation. Military sanitarians of the United States and Europe have published favorable reports.

The procedure involves an initial inoculation of 500 million. A week later one billion are injected. Ten days later a final dose of another billion is injected. It confers an active immunity of about two years' duration. Typhoid and paratyphoid vaccine can be injected together.

For curative purposes results have so far not been impressive.

Vaccine Against Cholera.—In the recent reports of military authorities in Europe there is sufficient confirmation of the far-reaching influence of this species of vaccination in preventing cholera and in attenuating it, if it develops later. Improvement has been noticed even when it was given during the incubation period.

Haffkine's method is the following: A weak strain of the comma bacillus is first used and produced by subjecting cultures to 39° C. Then after five days a stronger virus is employed and produced by introducing the bacilli into the peritoneal cavity of guinea pigs.

For prophylactic inoculations against cholera, three doses of 500, 1,000 and 1,000 million spirilla successively repeated every ten days should be given.

Vaccine Against Plague.—Haffkine's preventive inoculations of old bouillon cultures killed by heat have reduced the mortality and morbidity of the disease.

The ordinary dose for adults is about 3 c.c. given subcutaneously. It is repeated in higher dosage after eight days. Haffkine himself used a larger amount—about 20 c.c.

Agar cultures recovered in saline and killed, *attenuated living cultures,* and a *nucleoprotein solution* of Lustig have also been quite successful.

Vaccine Against Gonococcus Infections.—In connection with local treatment, vaccine treatment, with those of stock variety, have been found effective in chronic affections of Neisserian origin. These include gonorrheal arthritis, osteitis and bursitis, chronic vesiculitis, epididymitis and prostatitis, cystitis and pyelitis.

Fifty to one hundred million is an average initial dose. This is raised to four hundred million and administered every five days.

Autogenous vaccines are even more desirable because of the various strains of gonococci involved, but the difficulties of securing such cultures free from contamination are many. Inasmuch as the late stages of gonorrheal infections are sooner or later complicated by the presence of pyogenic organisms—Staphylococcus albus, citreus and aureus, Bacillus pyocyaneus, various streptococci, etc.—the injection of a stock gonococcus with mixed vaccines has been found quite effective.

Vaccines are of no use in the acute stage. In old chronic cases treatment has to be continued for a long period.

Vaccine Against Staphylococcus Infections.—F. C. Wood recognizes two groups of individuals who derive benefit from this vaccine: (1) patients of low resistance, e. g., those with recurring furuncles and carbuncles; (2) ill-nourished infants with skin affections.

Slight incisions to drain pus and dead tissue should be done. Under these conditions vaccines inhibit the development of fresh lesions. Large doses are the rule, initial ones being 500 million. They are later raised to 1,000 and 5,000 million. Less common infections of similar etiology, such as chronic septicemia and pyemia, otitis media, mastoiditis, arthritis, etc., are benefited by these vaccines, but autogenous vaccines are easily secured and should be used whenever possible.

Dysentery Bacillus Vaccine.—Except in conjunction with antitoxic serum, results have been almost negative.

Colon Vaccine.—Stock vaccines of this variety are devoid of result because the strains are so many. The autogenous variety give more effective results.

Streptococcus Vaccine.—Because of the acuteness of these infections, vaccines are quite useless. A similar vaccine is being tried out for the prevention of scarlet fever, but for a number of reasons its efficacy is quite problematical.

Whooping Cough (Pertussis) Vaccine.—Quite recent in origin, but it is the routine treatment at the present time. The Bordet-Gengou Bacillus is the etiological factor.

Immunization can be reasonably well secured by injections of 20 million bacilli into the buttocks, or skin of the abdomen and the dose repeated about four times according to indications. Prophylaxis is not as efficient as in typhoid vaccination.

For curative purposes the initial dose is 50 million, and this can be repeated every day or every two days; 100 million can be given in the severer cases.

Duration of disease and severity of paroxysms are lessened by this means.

Less Frequent Diseases.—Among less frequent diseases, *conjunctival affections* due to the invasion of the Morax-Axenfeld bacillus do well under the specific vaccine treatment. In like measure is it true of *gonorrheal infections of the iris* in respect to the use of gonorrheal vaccine. Vaccines have also been successful in the treatment of *acne* and other *skin infections, boils,* local infections of the *sinuses, antrums, middle ear* and other mucous membrane surfaces, of the sub-infectious *arthritides,* of *postoperative empyema,* of certain varieties of *periostitis* and *osteomyelitis,* and finally even *endocarditis.*

It is, however, always of prime importance to correctly diagnose the

attacking organism and then finally to apply the proper antigen in the form of a stock, or better still, an *autogenous vaccine*. As Rosenow has recently shown in following the transmutation of bacteria in the course of sub-infections, this is often a task requiring infinite skill.

DOSAGE

The following table taken from "Applied Immunity," by Thomas and Ivy, is a suggestion as to dosage:

Bacteria or Vaccines	*Minimum Dose*	*Average Dose*	*Maximum Dose*
Gonococcus	2-5 million	50-100 million	400 million
Colon	5-10 "	25-50 "	400 "
M. catarrhalis	10-25 "	50-100 "	300 "
Influenza	5-10 "	25-50 "	200 "
Typhoid	5-10 "	25-50 "	1,000 "
Pneumococcus	10-20 "	25-50 "	300 "
Streptococcus	2-5 "	25-50 "	200 "
Staphylococcus	50-100 "	100-400 "	1,000 "
B. punctatium	10-25 "	100-200 "	400 "
B. proteus vulgaris	5-10 "	50-100 "	400 "
B. of Friedländer	10-20 "	50-75 "	300 "
B. acne	5-10 "	25-100 "	200 "
Pertussis	5-10 "	25-100 "	200 "
Diphtheria	5-10 "	25-50 "	100 "
Pseudodiphtheria	10-25 "	50-100 "	300 "
B. pyocyaneus	....	50-100 "	400 "
B. fluorescens	....	50-100 "	400 "
B. pseudotuberculosis (rodentium)	25 "	50-100 "	400 "
B. acidi lactici	....	50-100 "	400 "
B. lactis aerogenes	....	50-100 "	400 "
B. mallei	2-5 "	50-100 "	400 "
B. fusiformis	10-25 "	50-100 "	400 "
B. of Koch-Weeks	....	50-100 "	400 "
B. Morax-Axenfeld	....	50-100 "	250 "
Tuberculin	0,000000001 gms.		0,001 gms.
Actinomyces	0,001 milligram	0,01 to 0,1 milligram	4 "

Section III

Prophylaxis and Treatment of Infectious and Contagious Diseases (Fevers)

General Remarks on Prevention and Treatment

There are two principal causative factors in infectious diseases—the seed and the soil. In good soil the destruction of pathogenic germs goes on all the time. In some instances the disease germ is known and can be handled by modern bacteriological methods; in many diseases the specific germ is as yet unknown.

Infective diseases are directly or indirectly communicable in a high or low degree. Thus a knowledge of the mode of infection and of the portal of entrance is of the utmost importance as regards prophylaxis. Generally speaking, we know that a lowered state of health from any cause is a predisposing factor. In some individuals there is a natural or acquired immunity to certain diseases due to phagocytic action or to bactericidal property of the blood.

Certain individuals are particularly apt to contract infectious diseases, and in almost all persons there is a liability to infection at certain periods and at certain ages. The newborn are liable to infection through the navel. In early childhood the gastro-enteric and respiratory tracts are frequently the portals of entrance for disease. Syphilis, gonorrhea and chancre find foothold from the age of puberty; cancer invades the body more readily after middle life. Tuberculosis, influenza, pneumonia, malaria, etc., are encountered at any age.

Temporary immunity against certain diseases may be established in most individuals by means of antitoxins or vaccines, as in diphtheria and typhoid fever, or by means of prophylactic administration of quinin—as against malaria.

We resort to screening against insects whose bite carries infection. We eliminate water-borne infections by boiling the drinking water. Against syphilis and gonorrhea, prophylactic measures may be employed locally

with a high degree of success, as shown by the reports of army and navy surgeons. Realizing as we do at the present time that the chief mode of infection is not by fomites but by contact with *living disease carriers*—even such as show no visible signs of disease—isolation and segregation, as prophylactic measures, assume greater importance than the much practiced fumigation of domiciles and clothing. Proper disinfection practiced on the basis of strict cleanliness will always hold its prophylactic value and the true physician who is also a sanitarian will equip himself with a thorough knowledge of preventive measures of scientific and practical value.

As regards treatment of infectious and contagious diseases, it may be admitted that in the present state of our knowledge only a few diseases are under control by reason of specific treatment, vaccines and sera. In the majority of instances our management is purely symptomatic. The immunizing agents already alluded to are also curative in their action and can be administered to the individual after the infection has already gained foothold, and we may predict with confidence that our so-called specifics will increase in number and potency as the years go by. Our general management as regards the circulation, antipyretic measures and elimination by the intestinal tract, by the kidneys and by the skin, is practically the same in all infectious diseases.

In order to produce *fever* by infection, bacteria or their products must actually enter the circulation. The same holds good for protozoa (malaria). We have no definite knowledge regarding the purely nervous irritation of the heat centers.

The significance of fever for the organism is still a mooted question. On the one side fever is looked upon as a direct danger and, contrariwise, a high temperature is looked upon as favoring a limitation of febrile disease. In many instances the clinical thermometer has proven a stumbling block instead of an aid in practice, and even intelligent practitioners are frequently made uneasy by a rise of temperature in a patient, and resort to early antipyretic measures, thereby distorting the clinical picture of an ailment, the nature of which is still in doubt.

Antipyretic drugs are only occasionally useful. The routine practice of administering antipyretic drugs as soon as the temperature rises somewhat above the normal is positively bad. Hydrotherapy is our main reliance against hyperpyrexia, the elimination of toxin being secured at the same time.

The therapeutic value of cold, fresh air in sickness cannot be emphasized enough. According to clinical experience, cold air inspirations have a positive value in febrile affections. Patients breathing cold air (adults and children) have a better digestion and sleep better than those in heated rooms. Bronchial catarrh decreases to a marked degree under

the influence of cold air inspirations, and the general course of disease appears to be favorably influenced.

The drinking of large quantities of cold water together with bowel irrigations, and the practice of keeping the windows of the sickroom open day and night, have given excellent results in fevers. Under such management, the quantity of urine increases and its specific gravity diminishes. The internal organs, which have the highest temperature during fever, are cooled and waste products are carried away by the water. (*See* Bedside and Office Technic.)

The nasopharyngeal toilet has for its object the cleansing and moistening of mucous membranes and should be employed as a routine measure.

The administration of diluted hydrochloric acid whenever the tongue is coated is, in the author's experience, the most valuable routine medication in all forms of febrile disease.

To maintain proper nutrition, the caloric requirements as regards food intake must not be overlooked. A dietary with a notation of calories in Household Measures, such as is given in the forepart of this book, will be helpful at the bedside.

Finally it must be emphasized that the management of acute infections and the nature of the soil in which infection takes place must be taken into consideration. Pneumonia, for instance, may establish itself in an individual burdened with chronic malaria or chronic syphilis, or we may have a double acute infection such as a *diphtheritic pneumonia* without *visible signs* of diphtheria. In such cases our pneumonia therapy must embrace potassium iodid, quinin or antitoxin as the case may be, in order to aid nature in its reparative efforts. This therapeutic reasoning is applicable to all acute infections.

Summary of Prophylaxis Against Communicable Diseases

(*See also* Section I)

The general principles involved in the prevention of infectious disease are not complex:

1. Isolation of the patient and avoidance of the sickroom.
2. Disinfection of rooms and contents by steam or chemicals or by cleanliness and sunshine; personal disinfection and prophylaxis, including fortifying the system.
3. Ventilation to prevent concentration of poisonous matter.
4. Disinfection or destruction of sputum and discharges.

The management of a case of contagious fever in a private house according to these principles is not difficult. The patient is isolated in a clean room, bare of all but the necessary furniture. A hall bedroom or one on the top floor is to be preferred. In some instances it may be advisable to keep the patient in the ordinary bedroom occupied at the time of his

being taken sick, and quarantine, in the best manner possible, this floor of the house, already infected. The well children are to be kept from school and church. Where the intercourse of parents with a sick child cannot be avoided, even when trained nurses are employed, it may become necessary to isolate the well children. Food and drink not consumed by the patient must be burned or disinfected in a slop jar holding a chlorinated soda solution. Dishes should be rinsed in soda solution, 5 per cent, and a sublimated solution (1 to 1,000) before returning them to the kitchen. As dried sputa are apt to spread through the air, all expectorated matter should be received into rags or paper spittoons, which are to be burned, or into a jar holding a sublimate solution (1 to 1,000). The sickroom should not be swept with a broom, to avoid raising dust. For cleaning purposes, employ moist rags, which are to be burned. Urinals, bed pans, and feces are treated with quicklime, bichlorid solution (1 to 1,000) or Labarraque's solution.

The nurse should not eat or drink in the same room with the patient, and before going to meals she should clean her hands and arms with green soap and sublimate solution (1 to 1,000) and put on a clean, long, loose gown, which should hang outside of the sickroom. During the period of desquamation the patient should receive a daily bath of tepid water containing green soap.

At the termination of a case the nurse should take a bichlorid bath (1 to 2,000) and wash her hair with the same solution. In case of death, the body is to be wrapped up at once in a bed sheet soaked in mercuric bichlorid solution (1 to 1,000) and no public funeral is to be permitted. The sickroom and all objects in it must be disinfected. Hard finish or painted walls and ceilings and floors may be washed or sprayed with disinfecting fluids. Papered walls may be rubbed down with a damp cloth or bread crumbs, or, better still, the paper should be removed. A fresh coat of kalsomine or whitewash is advisable wherever it can be applied. After disinfection, the windows must be kept open day and night for several days. Carpets, upholstered furniture, and other articles can be disinfected by steam through the health board or at private disinfecting plants.

Period of Isolation.—*Scarlet fever* patients are not to be returned to school until the lapse of six weeks or more.

Measles, four weeks or more.

Diphtheria, until cultures from the throat show that infection has disappeared.

Varicella (chicken pox), four weeks.

Pertussis (whooping-cough), indefinitely.

In small towns and villages with scattered dwellings the spread of contagious disease is easily prevented by isolation and rigid quarantine. The health officer of a town will placard the infected house and employ one or two persons to watch the premises and carry supplies to the inmates. From personal observation I am convinced that this supervision is lax, and sym-

pathetic neighbors are permitted to go in and out *ad libitum*. Disinfection by steam is not feasible in small towns.

Articles which are not to be destroyed should be disinfected by a lengthy exposure to sunlight and fresh air.

In the homes of the poor in our large cities preventive measures cannot be thoroughly applied. The conscientious practitioner will perhaps advise the removal of the patient to an isolating hospital, and in the event of refusal will do the best he can under the circumstances. He may order the patient to the front or rear room having the most light and air, and lock the door leading to the other apartments, entrance to the sickroom to be had by way of the hall.

Whenever the removal of a sick child to an isolating hospital is objected to by the parents, the health officers have no moral right to part mother and child, in the opinion of the writer. Whenever such a removal is imperatively demanded, such provisions should be made that the mother may accompany the child.

A tub of 3 per cent carbolic acid solution or Javelle water and a cake of sapolio should be placed in the sickroom for washing hands and for soiled linen, dishes, discharges, and bed pans.

Personal Prophylaxis.—It is positively known that a number of infectious and contagious diseases enter through the nasopharynx, but the general practitioner does not appear to appreciate the importance of such observations. The writer has pointed out on various occasions that scarlet fever and diphtheria are very apt to attack children having decayed teeth, large tonsils, and adenoid vegetations. And it has been stated by good authority that the tubercle bacillus frequently enters the system through the nasopharynx, and from there travels to the bronchial glands and the lungs. Therefore carious teeth in children should be extracted or filled, and large tonsils and adenoids removed.

Children exposed to diphtheria and scarlet fever should receive a teaspoonful of salt water in each nostril several times a day. This will carry away putrescible matter from the nasopharynx and prevent infection.

The mouth and teeth should be cleaned morning and night and, if possible, after meals. In this way particles of food may be removed, fermentation checked, decay prevented, bad breath prevented or lessened, and dyspepsia warded off.

Children should be taught the significance of "sputum disease" and the danger of contact with living disease carriers who cough and sneeze.

School Infection.—*The principal means of preventing the spread of contagious diseases in schools* are: Regular and efficient inspection by physicians; prompt exclusion and isolation of any one suffering from a contagious disease, or coming from a house where such disease is; compulsory notification of all infectious and contagious diseases; individual towels, drinking vessels, and other implements; children who have had a

contagious or infectious disease or who have come from a house where such disease prevailed should not be readmitted to school until sufficient time has elapsed since the occurrence of the last case to insure safety. Schools as well as contagious disease hospitals should be screened during fly time.

Rowland J. Freeman writes regarding school risks:

To obtain a good result from the application of these rules care must be taken that children isolated from the school after exposure do not come in contact with the other children of the same school at parties or other meetings. It may be added that the dangers of exposure at school are markedly lessened by the ample ventilation and free moving air in the school room and that the out-of-door schools have little tendency to develop epidemics.

In conclusion the following points may be emphasized:

1. Children with colds should be excluded from school.
2. Children exposed to disease at school should be kept from school, not during the whole period of incubation of the disease, but only during the period when the disease is likely to develop, as shown in the table.

Disease	Incubation Period	Period During Which Exposed Children Should Be Kept Out of School
Scarlet fever	2 to 6 days. Most often 3 to 4 days	1st to 6th day
Measles	10 to 17 days. Usually 11 days	8th to 18th day
German measles	2 to 3 weeks. Usually 17 days	10th to 22nd day
Chicken pox	14 to 16 days	10th to 22nd day
Whooping-cough	7 to 14 days	1st to 14th day
Mumps	3 to 24 days. Usually 17 to 20 days	12th to 22nd day
Diphtheria	2 to 5 days	1st to 5th day

Disinfectants

The Disinfection of Rooms.—1. All cracks or openings in the plaster or in the floor or about the door and windows should be caulked tight with cotton or with strips of cloth.

2. The linen, quilts, blankets, carpets, etc., should be stretched out on a line in order to expose as much surface to the disinfectant as possible. They should not be thrown into a heap. Books should be suspended by their covers so that the pages are all open and freely exposed.

3. The walls and floor of the room and the articles contained in it should be thoroughly sprayed with water. If masses of matter or sputum

are dried down on the floor, they should be soaked with water and loosened. No vessel of water should, however, be allowed to remain in the room.

4. Five ounces of the commercial 40 per cent solution of formaldehyd (formalin) for each 1,000 cubic feet of space should be placed in the distilling apparatus and distilled as rapidly as possible. The key hole and spaces about the door should then be packed with cotton or cloth.

5. The room thus treated should remain closed for at least ten hours. If there is much leakage of gas into the surrounding rooms, a second or third injection of formaldehyd at intervals of two or three hours should be made.

In the absence of a distilling apparatus, formalin fumigation may be obtained by mixing one quart of 40 per cent formaldehyd and 6½ ounces of potassium permanganate in a porcelain dish floating in a tub of water. The person mixing the chemicals must leave the room at once. The quantities mentioned are sufficient for a good sized room.

For Excreta.

In the sickroom:

For spore-containing material:

1. Chlorinated lime in solution, 4 per cent.
2. Mercuric chlorid in solution, 1 to 500.

In the absence of spores:

3. Carbolic acid in solution, 5 per cent.
4. Sulphate of copper in solution, 5 per cent.
5. Chlorid of zinc in solution, 10 per cent.

In privy vaults:

Mercuric chlorid in solution, 1 to 500.

For the disinfection and deodorization of the surface of masses of organic material in privy vaults, etc.:

Chlorinated lime in powder.

For Clothing, Bedding (*Soiled underclothing, bed linen, etc.*):

1. Destruction by fire, if of little value.
2. Boiling for at least half an hour.
3. Immersion in a solution of mercuric chlorid of the strength of 1 to 2,000 for four hours.
4. Immersion in a 2 per cent solution of carbolic acid for four hours.

Outer garments of wool or silk, and similar articles, which would be injured by immersion in boiling water or in a disinfecting solution:

1. Exposure to dry heat at a temperature of 110° C. (230° F.) for two hours.
2. Fumigation with sulphurous acid gas for at least twelve hours, the clothing being freely exposed and the gas present in the disinfection chamber in the proportion of four volumes per cent.

Mattresses and blankets soiled by the discharges of the sick:

1. Destruction by fire.
2. Exposure to superheated steam—25 pounds pressure—for one hour. (Mattresses to have the cover removed or freely opened.)
3. Immersion in boiling water for one hour.
4. Immersion in the blue solution (mercuric chlorid and sulphate of copper), two fluid ounces to the gallon of water.

For Furniture and Articles of Wood, Leather, and Porcelain.

Washing, several times repeated, with:

1. Solution of mercuric chlorid, 1 to 1,000. (The blue solution, four ounces to the gallon of water, may be used.)
2. Solution of chlorinated lime, 1 per cent.
3. Solution of carbolic acid, 2 per cent.

For the Person.

The hands and general surface of the body of attendants, of the sick, and of convalescents at the time of their discharge from hospital are to be treated with:

1. Solution of chlorinated soda diluted with nine parts of water (1 to 10).
2. Carbolic acid, 2 per cent solution.
3. Mercuric chlorid (1 to 1,000); recommended only for the hands, or for washing away infectious material from a limited area, not as a bath for the entire surface of the body.

For the Dead.

Envelop the body in a sheet thoroughly saturated with:

1. Chlorinated lime in solution, 4 per cent.
2. Mercuric chlorid in solution (1 to 500).
3. Carbolic acid in solution, 5 per cent.

To Prevent the Spread of Specific Vulvovaginitis

All vessels are to be sterilized immediately after use.

Chamber marked *clean* is to be used for *clean* cases only.

Chamber marked *vaginitis* is to be used for *vaginitis* cases only.

Douche pans ditto.

All wash cloths are to be sterilized after use.

The night blankets of any child with vaginitis are to be kept on the bed and not used for any other child.

All diapers worn by girls are to be first cleansed and then sterilized for twenty minutes.

To Prevent the Spread of Diarrheal Disorders

Nurses feeding children should not attend to the diapers unless no one else is available, in which case the nurse must thoroughly cleanse her hands

with *green* soap before feeding the child. All soiled diapers are to be put in a 2 per cent solution of crude carbolic acid as soon as they are removed from the child.

Infectious and Contagious Diseases (Fevers)

(*Alphabetically Arranged*)

Anthrax

Anthrax is a disease of cattle, transmittable to man, produced by the Bacillus anthracis and clinically manifested by two forms of skin affection and two forms of systemic invasion.

The infecting organism multiplies within the host by fission, but is capable of spore formation extracorporeally.

Clinical Forms.—The *malignant pustule* is the commonest type of skin lesion and develops after a short period of incubation as a papule on a broad area of induration. The papule becomes vesicular and eventually more or less necrosis occurs. Eccentric rings of papules may develop in crops about the parent eruption, thereby extending the process. A further extension occurs by way of the lymphatics and the glands become swollen. Eventually a septicemia may ensue, which has all the usual features of fever, prostration, etc., resulting in death even as early as the third day.

This septicemic condition is produced more often by the other form of skin infection known as *malignant anthrax edema.* In this type a brawny edema is produced without the development of papules, usually in areas where there is loose cellular tissue and systemic invasion is very rapid.

The septicemia of anthrax is peculiar because of the lucidity of the patient and the frequent state of euphoria even after the system has become profoundly poisoned.

The intestinal form is manifested by the development of a severe gastro-enteritis, together with the general symptoms referable to a systemic invasion, namely, fever, chills, prostration, pain in the muscles, dyspnea, hemorrhages into the mucous membranes and convulsions, coma and death.

The pulmonic type simulates a bronchopneumonia or acute miliary tuberculosis and usually runs a rapidly fatal course.

The differences in type are due to the fact that invasion occurs through several portals of entry and derive their relative grades of severity from the amount of systemic poisoning and the importance of the part attacked.

The diagnosis is clinched by finding the organism in the smears made

from the exudation of the skin lesions or in the sputum. Isolation of the germs from the blood, urine, or stools is a more difficult matter and, except with the best laboratory facilities, is not practicable.

Prophylaxis.—The logical mode of attacking such a disease as the one under discussion is by radical measures applied to infected cattle. The vaccination of cattle and sheep, according to Pasteur's method or one of the modifications growing out of it, has materially lessened the incidence of the disease. This is shown by the reports from districts where prior to the inauguration of these protective measures it existed in about ten per cent of the susceptible animals, and since their use only about one-half per cent of said animals became diseased.

The spread of the disease among cattle has received careful study and, besides direct contagion, it has been found that pasture lands can become contaminated by being watered with streams into which abattoirs, tanneries, etc., empty material which carries the bacillus. Another method of infecting pasture land is found in the habit of burial of diseased animals in them without filling the pit with quick-lime. It is supposed that earthworms spread the infection from this source. Where fodder is imported it may become contaminated by being stored in the hold of a vessel with infected hides or near diseased livestock and be the means of causing a widespread epidemic. Cattle may further be infected by the bites of flies or other insects, which live on carrion. Occasionally the feeding of one animal on the carcass of another dead of the disease may result in its further transmission.

Because of the prevalence of the disease among cattle and the ignorance, carelessness and greed of those engaged in the trades handling wools, hides, or other portions of the carcasses of diseased animals, the incidence of the affection in man is fairly large.

At Bradford, England, between the years 1907 and 1913 there were seventy-one reported cases with twenty-four deaths, and of the fatal cases fifteen were of the internal type and nine of the external. In Great Britain, between the years 1899 and 1905, there were three hundred and twenty cases with a mortality of 26.6 per cent. In our own country sporadic cases and small epidemics occur occasionally. The mortality statistics from the year 1901 to 1911 inclusive, for the United States, varied from twenty-three to fourteen cases, but probably a number of cases remained undiagnosed or unreported, and, of course, those cases which recovered are not shown.

The occurrence of the disease in this country is considerably less than in European countries, firstly, because our own herds have been better protected and, secondly, because the government has taken the stand of regarding all imported hides and raw wools as dangerous and requiring suitable precautionary measures to be taken unless the consul at the port of shipment has given them an absolutely clear bill.

In regard to the precautions taken, hides from "fallen" animals are excluded, bloody hides and wools are submerged in antiseptic solutions, and raw wools must be especially packed or handled in a moist state. It has been found that the danger in handling "fleeces" arises more from the accidentally present blood smears on them than from the hair being a normal habitat of the germ, or becoming so after the animal has acquired the disease.

The report of Dr. Eurich of the Bradford Commission, in 1908, that of one hundred and sixteen specimens of wool submitted from the local mills for examination, ten were contaminated by the anthrax bacillus, and the report of Dr. Glyn that he found the spores in 21.3 per cent of forty-one samples of hides and wools gathered from different sources of import, shows in how much danger certain classes of workers may be placed.

The stevedores suffer frequently and often most severely because, owing to the multifarious nature of the cargoes they handle, certain specific dangers are not likely to be so impressed upon them and they would be more careless than are industrial workers continually handling these materials.

Certain localities appear to be hotbeds of the disease. Thus, wools from Persia and Asia Minor are said to be more infected than those from Australia, and hides from China, Russia and Siberia are also reported highly infected. Dr. Legge reported, in 1905, that he believed all mane hair and most of the tail hair imported from China was infected.

Certain factors in connection with the germ itself make its eradication from infected material almost impossible. The most important is its ability in the presence of oxygen to form spores at temperatures ranging from 25 to 72 degrees Fahrenheit. These spores will resist ordinary drying for ten years, and it requires over three hours' exposure to a dry heat of 252 degrees F., or fifteen minutes to live steam, in order to kill them. Exposure to liquid air for three hours has failed to devitalize them.

It therefore seems impracticable to render most of the infected material safe without destroying it by either heat or cold. Washing was tried as a mechanical way of removing the germs, but they were found present after the most thorough cleansing possible. Disinfectants fail because the spores are protected by the surrounding blood clot. Formaldehyd gas or formalin solution is best because it acts as a fixing agent and so prevents the dissemination of the clot and germs in the form of dust.

The disease among factory workers handling the various infected raw materials has been lessened by carrying on the "carding" of wools under screens, ventilating the rooms by various exhaust devices which remove the infected air and bring in fresh air, better inspection of the material used, and proper disposal of suspected articles. Covering exposed portions of the body by gloves, leggings and veils has also helped to limit infection. Summing up, we find that those who are about cattle, sheep,

etc., those who handle their carcasses in various manufactures are most likely to acquire and transmit the disease. Besides, the bites of insects may also carry the contagion to man.

Prognosis.—The prognosis of the internal varieties of the disease is always bad. Only three cases where the germ was isolated from the blood are known to have recovered. The mortality in the cutaneous variety is about twenty-five per cent. Infection about the head and neck is more dangerous than elsewhere. The disease usually manifests itself shortly after exposure, occasionally within a few hours; but ten days have been reported between exposure and onset in one case. Spores take longer to develop than the bacillus itself. The local and general symptoms need not run with parallel severity. Fever is of better prognostic value than subnormal temperature and a sharp local reaction gives a better prognosis than a diffuse swelling. Failing pulse, tension and increasing rapidity of the heart action is a very bad sign. Death usually occurs between the third and seventh day from exhaustion if the case terminates fatally.

Treatment.—The treatment consists in removing the local lesion—probably best by galvanocautery, injecting the surrounding tissue with a 5 per cent carbolic or a 1:1,000 bichlorid of mercury solution, applying an antiseptic dressing and giving stimulants internally.

Davaine advised a solution for injection made of tincture of iodin (one part) and a ten per cent solution of carbolic acid (two parts). Colley advocates the use of ipecac locally and internally. Schlavo's *serum* has been used since 1897 by subcutaneous and intravenous methods in doses up to 80 c.c. It is obtained from immunized goats. Mendez has obtained a serum by immunizing horses, and advises 20 c.c. as a dose. Bettmann and Laubenhenner have used salvarsan with apparently good results. Becker has a very good series of cases in which the treatment consisted in rest in bed, alcoholic dressings and cardiac stimulation.

Practically all of the so-called internal antiseptics have been advocated, especially quinin, the salicylates and urotropin. It must not be forgotten that all dressings and other articles coming in contact with the patient must be sterilized or destroyed in order not to spread the infection to others. Further, it has been shown that the patient can auto-inoculate himself; as many as four separate local infections of this sort have been recorded.

One attack does not prevent another, but probably several slight attacks gradually induce a certain degree of immunity, for it has been found that a relatively large proportion of the cases occur in those just entering trades, where exposure is likely, and this has been explained by ascribing to the others a certain amount of acquired immunity.

The secondary effects of the disease—even when recovery takes place—are often quite serious and distressing. Besides the presence of unsightly scars, a favorite site of the local lesion is the upper eyelid, which may

be destroyed or so contorted or contracted that the sight is interfered with or ocular disease set up by irritation. Often surgical intervention is necessary to remedy these defects.

Bubonic Plague

Bubonic plague, so-called from one of its most frequent clinical manifestations, the bubo, has perhaps been the greatest scourge of the human race recorded in history.

Geographical Distribution.—The sixth century and again the fourteenth saw pandemics throughout Europe, which, in the latter instance, destroyed one-quarter of the population, or about thirty million people. In the great plague of London, in 1665, seventy thousand people out of a population of about four hundred and sixty thousand lost their lives. In the Bombay epidemic from 1896 to 1899 there were over one-quarter of a million deaths from the disease. At present the disease has, to a large extent, been eradicated from those places where good hygienic conditions prevail and efficient quarantine is maintained. The East and parts of the Mediterranean district still harbor the disease and are a source of minor outbreaks throughout the world.

Etiology.—The active factor producing the infection is the *Bacillus pestis bubonicae*. There is reason to believe that in infected districts it may lead an extracorporeal existence in the soil and so become an ever present menace.

Insects and small animals, especially the rat, are susceptible to the disease, but the horse, sheep, goats and cattle are immune, although the specific toxin affects them when experimentally injected. The prophylactic study of the disease has led to a wholesale warfare on rats in infected districts, and secondarily on insects which infest them and also attack man.

Infected clothing, linen, towels, etc., may also carry the contagion. It has been proven, however, that by careful supervision of these avenues of entrance for the disease, nursing and disinfecting can be engaged in with comparative safety. House disinfection has been rather unsatisfactory and in countries where the value of the dwellings is small, they are usually destroyed.

The disease reaches its height usually during the warm seasons, although it occurs all year round. No particular susceptibility is connected with age, sex or race. The virulence varies greatly so that two classes of cases have been described under the title of *pestis major* and *pestis minor*. During the height of an epidemic the mortality may reach ninety or even a hundred per cent, while at the beginning and end of the same, hardly any of the cases may prove fatal. Probably an average of all cases would

vary somewhere between thirty-five and fifty per cent. In a mixed community those living in the best hygienic surroundings suffer least.

The disease has usually an incubation period of about three to five days with extremes varying from one to fourteen days. In case of death the body should be cremated, and in case of recovery quarantine should be continued for at least a month after the patient is entirely well, in order to prevent him from becoming a "carrier," through the infection lurking in his excretions or in the pus from a suppurating area. Infection is supposed to occur through some skin lesion or by inhalation. The disease is essentially a sepsis, all tissues and body fluids being invaded by the organism.

Clinical Course.—The clinical picture in about three-quarters of the cases usually commences with the sudden onset of fever ushered in by chills, nausea, headache and pain throughout the body. By the third day the fever has usually reached its height, and the typical glandular enlargement in the groin, or less commonly in the axilla or about the elbow or knee, appears. These bubos are very painful and may attain considerable size. Secondary infection may cause suppuration and this is looked upon as a favorable sign. The toxin is hemolytic in tendency and quite large petechiae may be formed. Internal hemorrhages may also result. The pulse is usually accelerated beyond the point the condition would appear to warrant. The temperature varies at its height from 103° F. to 105° F., whereas the pulse ranges between 120 and 140 beats a minute. About the third day cardiac failure frequently terminates the clinical picture. If the case survives six days there is considerable hope for recovery.

Clinical Varieties.—Pulmonic Form.—An incidental complication is the so-called production of crops of boils, which in reality are local areas of moist gangrene of the skin spreading superficially. In about ten per cent of the cases a pulmonic form appears with all the signs of a bronchopneumonia. The sputum is found loaded with the specific organism. These cases are almost always fatal.

Septic Form.—A severe septic form also occurs in which the patient succumbs before any local symptoms can manifest themselves.

Minor Form.—Lastly, we have the minor form in which the whole course of the disease runs that of an ordinary bubo and, unless for some reason suspicion as to the real nature of the disease is aroused, it may go on to recovery without ever being diagnosed.

Prophylaxis.—Wherever plague exists preventive measures by an organized staff of health officials must be carried out. They embrace: Destruction of rats. Making houses rat proof. Cleansing of premises and ships. Inspection and detention of suspects. Isolation of the sick. Destruction of old infected buildings. Prophylactic vaccination.

Treatment.—For the specific treatment of the condition we have both

vaccines and serums of considerable value, although not absolutely certain in their effect.

Of the vaccines, Haffkine's has been most extensively tested and supported. The dose for adults ranges from 2 to 3 c.c., and for children, in proportion. It is given subcutaneously in the arm. There is a local and general reaction lasting a day or possibly longer. Two injections at an interval of ten days increases the value about ten per cent. The effect of the vaccination is of about three months' duration and has a decided effect on reducing both the incidence of the disease and also the mortality. The immunizing effect commences about a week after inoculation. Should infection occur prior to this the vaccination would probably serve to aggravate the condition.

Bannermann reports on an investigation of 6,000 cases that the mortality among the inoculated was only 43.5 per cent, as against 73.7 per cent for the uninoculated. Other reports have been even more favorable, but this seems to represent a conservative view. Tersin found that he could produce an active serum by injecting the live bacilli into a horse. Later Roux and others found that the dead organisms would answer as well.

Six months to a year are necessary to produce a satisfactory serum. The serum is given intravenously and locally, so as to be drained into the affected glands. Large doses ranging from 20 to 90 c.c. or higher are necessary. The action of the serum is bactericidal. In an epidemic at Oporto, Calmette and Salunberre reduced the mortality from 63.72 per cent to 14.78 per cent by the use of the serum.

A combined use of the Haffkine vaccine and Tersin serum has been employed, and this mode of treatment has met with considerable success.

Lustig prepared a serum with antitoxic properties by immunizing horses to the endotoxin of the plague bacillus. The reports on the cases so treated show a recovery percentage of 39.62, while untreated cases were represented by 20.21 per cent recovery.

The general treatment resolves itself into keeping the emunctories open, conserving the strength of the patient by rest, light but sustaining nourishment, and relieving the pain by the use of ice bags on the bubos or by giving morphia hypodermically. Cardiac stimulation may be urgently required any time throughout the disease.

Cholera Asiatica

Etiology.—Cholera asiatica is now universally recognized as being produced by a specific spirillum, to which Koch called attention in 1884. The spirillum appears in the stools of all cases and experimentally produces typical symptoms and lesions in susceptible animals. It has dis-

tinctive cultural attributes which serve to differentiate it from similar organisms.

As far as is known, infection in man always occurs through the mouth and is derived from the alimentary excreta of sufferers from the disease. The extracorporeal existence of the germs is usually short, but occasionally ground, spring and river water will harbor them for some weeks. Partially dry, soiled linen will sometimes retain active organisms from four to six weeks. Raw fruit and vegetables, milk, butter and bread will also support the contagium if infected.

Virulent organisms have been found in the intestinal tract of flies three days after their ingestion, and therefore the fact of the fly as a source of dissemination is proven. Air transmission of the disease practically never occurs, because drying of the germ destroys it so that dust is usually free from living spirilla.

It has also been noted in the past that the spread of epidemics has always been along the routes of travel and never faster than the means of communication existent, which would also tend to show that the manner of infection is usually a direct one.

Prophylaxis.—The means of protecting a community from this disease require if possible the prevention of infected cases entering it, or in other words, efficient quarantine. New York City furnishes a splendid example of this dictum as shown by the following report:

The mortality in 1849 for Manhattan and the Bronx from this disease was 5,000 deaths; in 1854 it was 2,500 deaths; and for 1866 it was 1,100 deaths. For the thirty-six years prior to 1913 there were only eleven deaths in all. Yet during this period occurred several epidemics in France, Italy and Spain, and the great epidemic in Hamburg during the month of August, 1892. Throughout all of these epidemics shipping was received from these countries and even directly from infected ports. The only goods not receivable were rags and clothing which had been worn. Ships that had been out of port seven or more days and could show a clean bill of health were regarded as noninfectious. Those that had a clean bill of health for the last seven days of the trip, but prior to that had had one or more cases of diarrheal disease, were regarded as suspicious and the passengers were removed and kept under observation for five to seven days, in order to allow any developing cases to manifest themselves. Where any doubt existed bacterial examination of the stools was undertaken. Passengers from infected ships were retained at quarantine for seven days and their point of destination noted, so as to warn the local health officers. All cases of the disease were treated at the quarantine hospital until death or cure resulted.

There is now an agreement between most countries to notify each other of cases occurring within their borders, so that the direction of threatened danger may be noted and proper precautions taken. All infected ships

must be thoroughly disinfected before receiving their clearance papers from ports within the confines of countries party to this agreement. If by any chance a case breaks through the cordon and develops within a country, the most essential thing is to prevent contamination of the water supply—otherwise the disease will quickly get beyond control. To do this the case with its attendants must be isolated and all the dejecta disinfected with unslaked lime. This procedure applies to the attendants as well as the patient, because it has frequently been shown that exposed persons will discharge spirilla in the stools although not suffering from the disease. Everything capable of being boiled can be thereby disinfected, while a three to five per cent solution of carbolic acid, lysol or creosote can be used to wash or soak other articles in. Attendants should be especially careful that the infection is not carried on their person, by attention to their apparel and bodily cleanliness. Basins with disinfectants for the hands should be available within the sickroom.

The termination of the case presents several problems, whether it be by death or recovery. The corpse of a cholera victim should be immediately wrapped in a sheet soaked in a strong solution of bichlorid of mercury, and cremated as soon as possible. Burial is a decidedly dangerous procedure even though virile organisms usually disappear from the cadaver in two weeks.

In the case of recovery, the duration of quarantine is an important question. The answer must be that only when the patient is both clinically cured and no longer, on repeated examination, exhibits spirilla in culture from the stools can unrestricted communication with the community at large be permitted. It must always be remembered that there are "cholera carriers" as well as "typhoid carriers." As a rule the period that these people retain active germs is not as long for the former disease as for the latter.

The community in which a cholera case breaks out should be warned and certain precautions advised. Nothing but cooked food and boiled milk and water should be used and every means of protecting these from contamination resorted to. All forms of gastric and intestinal disturbance must be looked upon with suspicion and such cases carefully isolated and treated, both as a protection for themselves and others. People in general must be warned against over-indulgence in eating and drinking, for acute or chronic indigestion predisposes to infection. Domestic animals do not spontaneously contract the disease, so that anything more than ordinary supervision is unnecessary. A warfare on the fly should be waged untiringly, as it is a carrier of this as well as of many other infections.

Clinical Course.—About the disease itself certain facts are worthy of note. Infection occurs at all ages but is relatively more frequent among adults. When it occurs at either extreme of age the prognosis is unfavorable. Sex has no influence on its inception. Climatic conditions have

little effect, although it has been noted that the disease appears most frequently during warm weather at sea level and does not gain much headway where the soil is sparse and the substrata rocky.

The disease commences after a short incubation period ranging from two to five days and may develop all grades of seriousness. In some cases slight nausea and general malaise with moderate diarrheal symptoms for a few days may be all there is to it; in other cases a rapid syncope ending in death within a few hours may occur.

The common and typical course passes through several stages, however. At first there may occur several loose movements, with more or less languor and depression. After this has gone on for two to five days, prostration—often sudden—becomes extreme. The movements become copious and have the appearance of rice water. The appetite disappears, thirst becomes insatiable, and severe vomiting sets in. The pulse becomes rapid and feeble, even to the point of obliteration over the radial arteries. The surface of the body is cold and appears mottled; the lips are deeply cyanotic; internal temperature, as shown by a thermometer in the rectum, may be elevated, however. The mind often remains perfectly rational although the patient is always very apathetic. Occasional coma supervenes. Little or no urine is passed, and if any is voided it is highly charged with albumin; sweating nevertheless may be quite profuse. Severe cramps in the flexor groups of muscles increase the suffering greatly. This stage lasts from a few hours to a day and frequently is terminated by death.

If the patient survives this stage, a period of reaction sets in which presents several common types. The circulation may pick up, fever and delirium may subside and a general typhoidal condition develop, through which the patient may battle to recovery or sink to death. Again this period may be overshadowed by the symptoms of a profound uremia. Coma or convulsions are frequently present. The urine is suppressed or passed in small quantity when it shows every evidence of grave kidney degeneration.

The disease may especially manifest itself by various severe local reactions. There may be a pseudomembranous inflammation in the bowels. Various skin eruptions are also common, among which erythematous and urticarial types are the most frequent. Secondary infection of the larynx, bronchia and lungs, of the bladder and female genital organs, of the parotid and submaxillary glands and of the skin, produce serious complications.

A last class presents a relapsing form in which the patient appears a little better, only to get worse again and finally die.

During the whole course of the disease the organisms remain in the alimentary tract and not until late in the disease do they invade the mesenteric glands. The mucous membrane, solitary follicles and Peyer's patches contain them in large numbers, however.

Prophylaxis and Treatment.—Haffkine's cholera vaccine has reduced the incidence of the disease, and among those who contracted it after the inoculation the death rate was considerably less than among the untreated. The use of the vaccine is suitable for establishing immunity between epidemics and for persons going to an infected region.

Two vaccines, a weaker and a stronger, are used in establishing immunity. They are given at five-day intervals, as this has experimentally been proven to be the time required to induce the maximum results. The weaker vaccine is injected first.

One cubic centimeter represents a dose and is given hypodermically in the outer aspect of the thigh. There results a certain amount of general and local reaction, and this establishes a partial immunity which prevents a too violent reaction at the site of injection of the second and stronger vaccine.

The reaction is proportional to the amount of protection afforded, so that considerable local and general symptoms are to be looked on with favor. Haffkine reports 70,000 injections in 42,179 individuals with no serious accident and a decline of the incidence and mortality among them of about 50 per cent, as compared with a corresponding group of non-immunized persons.

As live organisms are used, considerable care must be exercised not to spread the virus where it might accidentally enter the alimentary tract. Kolle has tried to offset this danger by injecting dead bacilli with encouraging results, although probably not quite equal to Haffkine's.

In the management of a case of Asiatic cholera care must be exercised to (1) neutralize the cholera toxins by a specific serum; (2) reestablish a good circulation by restoring the lost water and salts and by stimulating the patient; (3) combat dangerous complications, the most urgent of which is anuria.

The patient must rest in bed and subsist for a time on farinaceous water—egg white in water, gum arabic in water, brandy in water, hot coffee given in small quantities at frequent intervals.

If an antitoxic serum is available it should be used as soon as the diagnosis is fairly established. Acidulated water (dilute sulphuric or hydrochloric acid) may be taken freely.

Water and salts are to be restored to the system by *enteroclysis* (one to four pints): 90 grains (6,0) of salt to the pint, 500 c.c.; *hypodermoclysis:* 90 grains (6,0) of salt to the pint, 500 c.c., *venous infusion:* (8,0) of salt to the pint, 500 c.c., at temperatures from 90°-100° F. (one to two pints).

Rectal injections may be repeated every two to four hours. After transfusion renewed restlessness and a feeble pulse call for another injection. Rectal injection of tannic acid, two per cent in water, at 105° F.,

may be employed in place of the saline, with a soft rubber tube or by means of the Murphy drip. From one to four pints may be slowly injected.

If abdominal pain is marked a full dose of morphia should be injected hypodermically, and repeated if necessary.

Keeping up the body fluids is the most important therapeutic measure, thereby favoring dilution of the poison, increase of the pulse tension, and increase of the activity of the emunctory organs.

Camphor heads the list of stimulants for this condition. In emergency it may be administered in a 20 per cent solution with oil and ether hypodermically in 1 c.c. doses every half hour. Five grams of camphor to the litre of red wine plus a little gum arabic forms a useful drink. The camphor is first dissolved in alcohol and then mixed with the wine. The dose varies from a teaspoonful for a child to a wineglassful for an adult. This mixture may be given in peppermint water to young children. Digitalis and strychnin may all be useful in warding off a collapse.

Keeping up the bodily heat is a very important factor. This can be done by warm blankets, hot water bottles, or in any way available. The cramps in the muscles can be relieved by massage and heat. The vomiting is often a serious feature and attempts should be made to control it by the use of cracked ice, champagne, cocain, hydrocyanic acid and stupes to the abdomen. Drop doses of tincture of iodin in peppermint water are also employed to check vomiting.

Uremic conditions are relieved by the following solution given per rectum at 105° F. by the Murphy drip (Fischer's method):

Sod. Chlor.	15,0	3iv
Sod. Carb. crystall.	15,0	3iv
Aquae	1000,0	O.ii

If the symptoms are urgent the above *sterile* solution may be given *intravenously* (100,0).

An intravenous injection may be followed by the rectal method or may be repeated after three hours.

In the convalescent stage other articles of fluid diet may be cautiously added to the restricted menu.

Croup

Clinical Forms.—In practice we recognize:

1. A croupy cough without stenosis.
2. A pseudocroup with dyspnea and occasionally urgent stenosis.
3. True membranous croup with progressive stenosis.

A CROUPY COUGH is a common ailment in children afflicted with adenoids. It comes on suddenly as a rule, and subsides within twenty-four

hours. A cold compress worn around the neck, an albolene spray into the nostrils, or a few drops of wine of ipecac in hot milk every two hours, is all the treatment required. An ointment composed of ten grains of camphor in one ounce of lanolin may also be rubbed into the skin of the neck and chest.

A PSEUDOCROUP is frequently observed in children sick with measles. This form of croup usually subsides within a day or two, if the simple management suggested under "croupy cough" is adopted. In addition the patient may inhale steam from a croup kettle.

If, however, an inspection of the pharynx reveals inflamed tonsils and a punctate or confluent pseudomembrane anywhere within the pharynx, an injection of three thousand units of antitoxin must be given promptly, because mixed infections are very common, and one or more injections of antitoxin can usually be depended upon to prevent the spread of the pseudomembrane into the larynx.

TRUE MEMBRANE CROUP is either primary membranous laryngitis or is secondary to diphtheria of the nasopharynx.

In primary membranous croup the pharynx is pale, the temperature normal, the onset is never sudden, hoarseness, aphonia and stenosis come on gradually. About eighty per cent of membranous croup cases are diphtheritic—in about twenty per cent of cases the diphtheria bacillus is not found.

Prophylaxis and Treatment.—True croup should be quarantined and treated as is diphtheria. If antitoxin is administered early and in large doses, about seventy per cent of membranous croup cases recover *without operation.*

The initial dose of antitoxin should be from 5,000 to 10,000 units, and these doses are to be repeated in twelve hour intervals, or as experience and judgment dictates.

If the stenotic symptoms do not increase within the next twenty-four hours the outlook is favorable.

Medication.—It is the writer's experience that a membranous croup loosens up more readily under antitoxin treatment if one large dose of calomel is administered in the beginning of the treatment (gr. v to a child —gr. x to an adult). All other medicaments, including emetics, are useless and harmful.

Steam inhalations, on the other hand, by means of the croup kettle, administered for half an hour several times a day, are serviceable. The steaming kettle should be placed near the patient, but *not* under an improvised tent, which prevents the patient from getting a plentiful supply of fresh air so urgently needed in this ailment.

As soon as the stenosis is less urgent, and the cough becomes loose, the main danger is over, whereupon camphor or aromatic spirits of ammonia may be given as an expectorant and stimulant four times a day. The same

management should be resorted to in secondary stenosis following whooping-cough, the eruptive fevers, etc.

Operative Interference.—When antitoxin fails to check a progressive stenosis, the time for operative interference is close at hand. The proper time for operation is a matter of experience. The physician should not wait until the patient is cyanosed and the pulse is intermittent.

In urgent cases we are then left with two alternatives—intubation and tracheotomy. The first is the operation of choice, but where the instruments are lacking or the disease has extended into the lower trachea, tracheotomy must be performed.

Intubation and tracheotomy must be practiced on the cadaver before they are performed on the living.

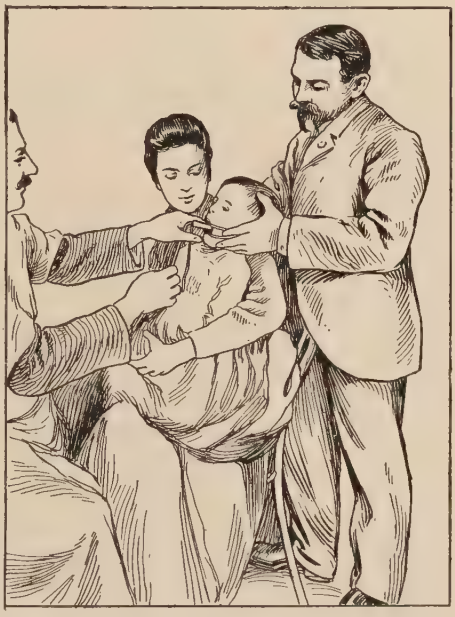


Fig. 67.—Intubation of the Larynx for Acute Stenosis (Croup).

Intubation.—The operation of intubation, as devised by Joseph O'Dwyer, may be performed on the patient in a sitting or reclining posture, with the aid of two assistants to control the patient, and a mouth gag.

The tube varies in size for patients of different ages. It is spindle-shaped so that when in place the widest part is found projecting into the ventricular spaces between the true and false cords. By this means the tube is retained in place even when fairly violent coughing occurs, but excessive attacks, especially if the lumen becomes plugged, will cause it to be expelled. The upper end posteriorly has an overhanging collar which rests on the arytenoid cartilages. This collar is perforated on one side near its anterior end so as to permit of the passage of a loop of silk cord which is used for a speedy extraction in case of faulty introduction or in case the lumen becomes plugged. The introductor has a flexible stylet tip, on which the tube is threaded and retained by contact. There is also a contrivance on the introductor whereby, after the tube is in place, a flexible metal sleeve can be pushed down towards the end of the stylet. This catches on the intubation tube and as pressure is continued the result is a detachment of the stylet. The instrument is curved to conform with the anatomical conditions present. The tube is removed usually by an extractor which, near its tip, has a small "glove stretcher contrivance."

It is introduced, closed into the upper end of the intubation tube and then opened. This gives sufficient pressure to the sides of the tube to enable the operator to withdraw the tube with the instrument. This instrument is also curved like the introductor.

All the operations here referred to are aided and guided by the index finger of the free hand of the operator, which is used for manipulations within the mouth. After the tube is properly in place and good breathing is established the loop of thread mentioned above may be cut and removed or else pasted to the side of the cheek with some adhesive plaster. This latter is usually done in home treatment, where the patient might suffocate if any accident occurred before medical aid arrived.

Certain accidents connected with the introductor are possible. First, the tube may be lost down the esophagus if that passage is mistaken for the trachea. Undue violence may cause trauma. If the tube is not kept in the median line, its lower end may be deflected into one of the ventricles, and damage done according to the subsequent amount of force exerted. The introduction of the tube may detach a piece of membrane which plugs its lumen and necessitates the immediate removal of the appliance. If the tube is at all in proportion to the size of the patient it is impossible to force the upper end below the cords without using greater force than should ever be employed. Ordinarily tubes are retained in place four or five days and then removed to be reinserted with the first evidence of returning asphyxiation. Some cases are particularly annoying because the tubes are so frequently coughed up. If the size is not at fault, special extra long tubes may be used or tubes fashioned after a pattern suggested by Lynah, having a straight shank and a bulbous lower extremity, which imbeds itself in the soft tissues. These tubes have to be removed frequently to prevent difficulty in withdrawal. Four days is placed as the limit by their designer.

Feeding in Intubation Cases.—As long as the tube is *in situ* great care must be exercised in feeding the patient. (*See* Bedside and Office Technic.) Most children will swallow well in the dorsal-horizontal posture. Occasionally gavage may be necessary.

Medication in Intubation Cases.—Stimulant heart tonics, antipyretics, etc., can be given with the food, subcutaneously or per rectum.

Secondary Stenosis after Extubation.—A mild secondary stenosis after extubation is occasionally observed and usually yields to a few doses of antipyrin.

Serious forms of secondary stenosis may be due to muscular paralysis, hypertrophic growth, formation of polypi, cicatrices, or the absorption of the tracheal cartilages, allowing the walls of the trachea to collapse. Obstruction due to granulation tissue is overcome by the use of graded tubes. Muscular paralysis usually rights itself and a tube is worn until this occurs.

Tracheotomy.—Absorption of the cartilages may require tracheotomy and extensive plastic operations. When tracheotomy is done it should be so carried out that the upper tracheal rings are split in the midline, above or below the thyroid isthmus. Occasionally the membranes extend down the trachea and plug the main bronchi.

The operation of tracheotomy is facilitated by using the author's automatic tracheal retractor. This instrument, devised many years ago, consists of a rubber band to each end of which is attached a curved double hook of nickel-plated steel. It is hooked into the tissues as they are divided and will hold aside such blood vessels as are in the way of the knife.

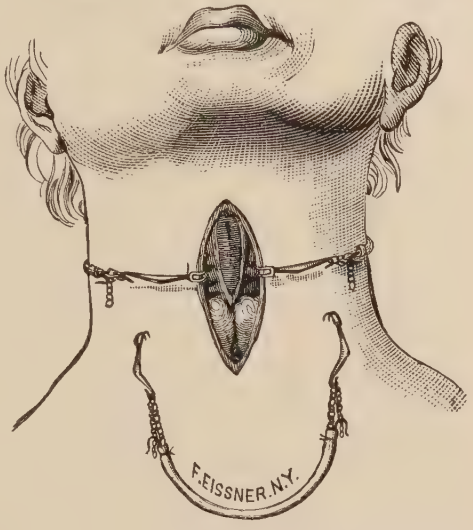


Fig. 68.—The Author's Automatic Tracheal Retractor.

Complications. — Diphtheritic Bronchopneumonia.—This is the most fatal of all croup complications and rarely responds to antitoxin—stimulants and expectorants.

Dengue

Dengue is a disease of tropical climates occurring in widespread epidemics, and during its prevalence affects a large majority of the persons exposed. Clinically it is a sort of hybrid representing both influenza and rheumatism, with both of which diseases it has been confounded.

Etiology.—Its etiology is still obscure, although a micrococcus has been reported as occurring in the blood of patients having the disease. From the nature of the disease, its contagiousness and the relative immunity from subsequent attacks established by the initial one, little doubt can exist of its microbic nature.

Clinical Course.—The onset follows an incubation period of three to five days with fever, headache, pain in the muscles and usually an erythematous rash over the entire body. The fever maintains its elevation for a day or two, and during this time the joints become more or less universally swollen and tender. The stiffness frequently affects especially the spine, so that the carriage is grotesquely foppish and dandified—hence the name. At the end of this period the temperature falls. The

rash fades and the patient is left prostrated, stiff and sore. A recrudescence usually occurs twenty-four to forty-eight hours later, and this time the rash may be of multiform character, macular, urticarial, scarlatinal, or vesicular. The latter eruption is followed by desquamation.

The average length of an attack is about ten days to two weeks. Very few deaths have occurred from this malady, but recovery is often a tedious matter, due to the pain and stiffness left in the joints and muscles. During the height of the disease there may be nocturnal delirium and children may have convulsions. The mucous membranes are injected and hemorrhages may occur from the stomach and bowels. All ages and classes of people are attacked and there seems to be no adequate means to ward off the attack, except *by removal from locations where it occurs.*

Treatment.—Treatment is entirely symptomatic. An initial mild catharsis, rest in bed, and the use of analgesic remedies constitute all that can be done during the attack. Tincture of belladonna, given in two or three drop doses twice a day, has seemed to give considerable relief to the muscular pains. The salicylates, quinin, urotropin, antipyrin and many of the synthetic drugs belonging to this class, have been reported as being of more or less benefit, but probably in most cases the disease runs its course without much modification by any of them. When stiffness of joints remains after the disease is over, hydrotherapeutic and electrical treatment, together with gymnastics and massage, are indicated.

Diphtheria

Diphtheria, as understood at the present day, means an infection with the Klebs-Loeffler bacillus and refers, unless otherwise stated, to affections of the nose, throat, or upper part of the respiratory tract. The word originally had a generic meaning, referring to all inflammations of the mucous surfaces associated with the production of false membranes. The term *croup* was used if the disease was situated in the larynx. The Klebs-Loeffler bacillus is occasionally found in other locations than those already given and may be the cause of wound infection, etc., and may very rarely be carried in the general blood stream.

Clinical Course.—The virulence of the organism under discussion varies greatly, so that all extremes are found from a non-pathogenic form to the most deadly. At present we have no way of estimating this factor clinically. Even inoculation experiments are unsatisfactory, because the same strain may produce violent symptoms in one variety of susceptible animals and not affect others; therefore, the probable outcome in cases of human infection is more or less uncertain.

Another factor which influences the severity of disease is the amount and kind of secondary infection. A violent streptococcus infection fre-

quently complicates the picture and a number of pathogenic bacteria are occasionally found in conjunction with the Klebs-Loeffler bacillus.

The eruptive fevers may be associated with a true diphtheritic invasion, but usually the angina occurring at the height of these diseases is not produced by the specific organism.

In laryngeal cases the mechanical effect of the stenosis produced greatly modifies the picture.

A word or two about the *typical diphtheritic membrane* may be in order:

The process starts by a coagulation necrosis of the epithelial cells caused by the toxins generated by the bacteria. Serum exudes into this degenerated mass and fibrin forms. Leukocytes invade the interstices and bacteria develop here also. The color of the membrane is a grayish white, but blood and débris may change this to a brownish black. Saprophytic action may be in evidence.

The disease follows a short incubation period of two to five days. The period of invasion is characterized by sore throat, headache and general feeling of malaise. The temperature slowly rises to 102° or 103° F., but high fever is not ordinarily part of the picture. When the disease is fully manifested we get the picture of general toxemia. The prostration is extreme and cardiac collapse may occur at any time. Various paralyses may occur, the most dangerous being those of the respiratory muscles and those governing deglutition. The paralyses may occur at the height of the disease, but frequently appear after the patient seems on a fair road to recovery. Unless the paralysis affects the vital functions, ultimate complete recovery from them is the rule.

Clinical Forms of Diphtheria and Septic Sore Throat in which Antitoxin is Indicated:

1. Tonsillitis and primary tonsillar diphtheria.
2. Primary and visible pharyngeal and tonsillar diphtheria with extension into posterior nose but without invasion of larynx.
3. Primary nasal diphtheria with and without complicating croup (larved diphtheria).
4. Primary membranous croup in children (intubation).
5. Primary membranous croup in adults (tracheotomy).
6. Diphtheritic ophthalmia, suppurative keratitis and infectious ulcers.
7. Wound diphtheria, puerperal diphtheria, diphtheria of vulva, diphtheria following operations on tonsils, adenoids, nose (sepsis, delirium).
8. Bronchopneumonia with diphtheria of deep respiratory tract in children and adults (cyanosis, dyspnea, rapid heart, collapse, coughing up of casts).
9. Measles with early diphtheria—with late diphtheria—with croupy

cough and so-called tonsillitis, with stenosis (congestive or membranous stenosis).

10. Scarlatina with early or late diphtheria.
11. Erysipelas following diphtheria.
12. Diphtheritic stomatitis and noma.
13. Whooping-cough, stomatitis, croup and stenosis.
14. Diphtheritic enteritis.
15. Septic sore throat and Vincent's angina.
16. Diphtheria without membranes.

Behring's great discovery of *diphtheria antitoxin,* which made its practical *début* in 1894, has revolutionized the treatment of diphtheritic infection; it has saved many lives and added much to the sum total of human happiness. Statistics show a lowered mortality of at least fifty per cent in all kinds of cases, mild and severe. The experience of the individual physician is still more convincing than statistical figures. Whereas formerly he had the feeling of helplessness he now feels that the disease is under control if taken in time. Thus after twenty years of practical experience with this therapeutic agent the civilized world has accepted diphtheria antitoxin as a true specific, both curative and protecting, but the mortality from diphtheria still remains higher than was predicted by Behring (five per cent) and higher than it should be if it has the curative power we attribute to it.

To my mind, the principal reason for the present day mortality in diphtheria, not taking into consideration the occasional and unexplained violent epidemics, lies in the fact that we do not sufficiently recognize the *great divergence of clinical manifestations of diphtheria* and, furthermore, that we have failed thus far to educate the general public along these lines.

Of all acute infections diphtheria and influenza stand first in their great divergence of clinical manifestations, and in order to get the best results and make the best use of a great remedial agent in diphtheria, we as a profession must know all phases of the diphtheria situation and should be willing to spread our knowledge to the public as much as feasible, in order to get its coöperation.

Antitoxin in Tonsillitis and in the Ordinary Forms of Diphtheria

Tonsillitis and Diphtheria Compared

We need not take up much time discussing the usual forms of diphtheritic localization with which even the layman is familiar. Apart from such cases as show a tendency to relapse after first improving, the primary pharyngeal, tonsillar or laryngeal diphtheria cases show great uniformity in their behavior under repeated doses of from 3,000 to 5,000 antitoxin

units. With good hygienic management and energetic and early specific treatment the mortality is not much over 5 per cent. But, if in the presence of a visible pseudomembrane or exudate we assume the ultra-scientific attitude of waiting a day or two for a confirmative laboratory report before administering antitoxin, our mortality will be 12 to 15 per cent, and such indeed are the mortality figures for the State of New York and Pennsylvania in the last few years. The principle of giving the patient the benefit of the doubt is as safe and sane in diphtheria as it is in syphilis, and, moreover, in the first mentioned acute infection no time is to be lost, and in the event of an unfavorable termination of a bad case we can bow to the inevitable without regret or reproach.

The clinical behavior of so-called tonsillitis in our large cities is about as follows:

If we look into the throat in a case of so-called follicular tonsillitis we see an inflamed large tonsil with white dots (not patches). That according to the textbooks is tonsillitis, which should subside in a few days under nonspecific management. But what we frequently observe in such cases is, that on the occasion of our second visit and inspection, we find that some of these spots have coalesced to a small patch, and subsequently to a large patch, with all symptoms of diphtheritic sepsis. The experienced practitioner knows that it is often impossible to *distinguish clinically between tonsillitis and diphtheria,* and that it is unwise to wait for a confirmatory laboratory report before giving antitoxin. Whenever we observe sore throat in a child with fever and swollen lymph nodes, be the lesion ulcerative or exudative, antitoxin is promptly indicated. The fear that a family or community will be needlessly alarmed by a call for antitoxin in cases in which the laboratory report is subsequently negative must not deter us from using this remedy in good time, particularly if we emphasize its prophylactic virtues in doubtful cases.

Nasal Catarrh and Primary Nasal Diphtheria

When the writer first went to school in a little log house on the bank of the Mississippi, in Iowa, in 1861, most every boy and girl had a running nose in the winter. No doubt some had adenoids or other nasal obstruction and occasionally all had so-called "colds," with a thick, whitish discharge from the nostrils frequently associated with a croupy cough. Diphtheria had not penetrated to our region, and running noses subsided in due time.

Now what do we frequently observe at the present day in New York City? A running nose, usually one-sided; a thin, blood-colored, greenish discharge; an excoriated upper lip; perhaps a week later a croupy cough is noticed and stridulous breathing, and finally stenotic breathing and cyanosis. *During all this time the pharynx is free from pseudomembrane, and pale in appearance.* The experienced colleague recognizes the clinical picture of primary nasal diphtheria at an early stage, and extinguishes

the smouldering flame with a few doses of antitoxin. The clinical novice may or may not apply the remedy when it is all but too late, although in primary nasal diphtheria he has ample time to wait for a laboratory report before administering specific treatment.

Antitoxin in Scarlet Fever and Measles

When scarlet fever or measles is complicated by diphtheria *from the start,* we usually have to deal with a severe double infection which is occasionally fatal in spite of early energetic treatment. In such cases it is extremely unwise to wait for a confirmatory laboratory report, because one or two harmless doses of antitoxin will assuredly counteract a part of the sepsis and may turn the tide in favor of the patient. In measles with so-called follicular tonsillitis a subsequent laryngeal stenosis is not infrequently observed and should be promptly forestalled by the administration of antitoxin.

In measles and scarlatina, diphtheria is often a complicating feature *after the skin eruption has subsided.* Such cases are not as severe as the simultaneous double infection, and here the antitoxin need not necessarily be administered until throat symptoms are really in evidence.

Antitoxin in Some Forms of Bronchopneumonia

It is not generally appreciated that certain forms of bronchopneumonia and pleuropneumonia can be favorably influenced by diphtheria antitoxin.

An apparent *primary diphtheritic bronchopneumonia* is an occasional occurrence in adults as well as in children. The clinical features of this variety of bronchopneumonia differ somewhat from the simple, the syphilitic, the tuberculous, or the influenzal varieties, inasmuch as an early and persistent subjective and objective dyspnea with pronounced cyanosis are much in evidence. Not infrequently large and shreddy membranes are coughed up, the voice is usually husky, hoarse and croupy. Whenever a primary or secondary diphtheritic bronchopneumonia is suspected antitoxin should be administered freely and under circumstances in large doses, at the same time five grain doses of camphor in oil should be given every two hours for a period of one day. This variety of bronchopneumonia is frequently fatal, but recoveries under specific treatment have been observed and reported.

Antitoxin in Whooping-Cough and Diphtheria

Whooping-cough may be complicated by a visible throat diphtheria or by membranous croup with a free pharynx. The congested condition of the upper respiratory tract in pertussis favors diphtheritic infection. Therefore, antitoxin is indicated as soon as the slightest visible throat or

nose exudate or membrane is in evidence, and in the event of a *croupy cough* in pertussis, the prompt administration of antitoxin is life-saving, inasmuch as it usually makes intubation unnecessary, for it is well known that intubation in children weakened by severe spasmodic cough is usually followed by severe bronchopneumonia which may end fatally in young children, in spite of the best management. In some cases a careful observer will find the whooping-cough blisters (stomatitis) in the mouth of the child covered with a dense pseudomembrane, several days before the croup symptoms are in evidence and will promptly administer antitoxin in order to limit or overcome the spread of the exudative inflammation.

Antitoxin in Stomatitis and Noma

We all have seen ulcerative stomatitis and noma (gangrene) with extensive destruction of tissue. It is quite natural, inasmuch as these lesions usually begin somewhere on the buccal surface, that we should look for diphtheria bacilli in these cases, suspecting a mixed infection. But such cases usually run their course with culture findings negative as to diphtheria. Notwithstanding this well-known clinical fact, it is wise to give a few doses of antitoxin in such cases, first on general principles and because there are cases on record in which improvement set in as soon as diphtheria antitoxin was administered.

Antitoxin in Foul-Smelling Sore Throat and Mouth with a Puslike Nonmembranous Exudate

Two cases of this variety of sore throat recently came under my observation. A girl of twelve first took sick, then her brother of five. The pharyngeal exudate was puslike, the laboratory report was staphylococci. No diphtheria bacilli. The girl became rapidly anemic and too weak to sit up. Local measures, stimulation and the administration of the tincture of chlorid of iron gave no improvement. In the third week 3,000 antitoxin units were administered every other day, altogether three doses, whereupon rapid improvement was noticed.

The younger child after being ill in the same way for a week, developed croup and progressive stenosis and was well after five doses of antitoxin, each 3,000 units. Here also a culture was negative as to diphtheria bacilli.

Such cases seem to bear out the contention of those investigators who claim positive therapeutic virtues for diphtheria antitoxin in certain non-diphtheritic ailments.

Antitoxin in Miscellaneous Forms of Diphtheria

Pseudomembranous conjunctivitis is not, as a rule, diphtheritic but it may be. This is also true of ulcerative and suppurative keratitis. In all positive or doubtful cases antitoxin is indicated.

Cases of puerperal sepsis with a visible pseudomembrane on the labia or deeper parts should receive one or two injections of antitoxin without waiting for a laboratory report.

Cases of facial erysipelas following tonsillar diphtheria have been observed and should receive specific treatment.

Diphtheritic enteritis with a passing of large membranes and well-defined postdiphtheritic paralysis have been reported.

Wound diphtheria, especially after operation on the nose and throat, is not a rare occurrence.

Adenoid vegetations may also be the primary seat of a diphtheritic process. For bacteriologic examination, the material in such cases must be taken from behind the soft palate or through the nose.

In all these miscellaneous forms of diphtheria, antitoxin is indicated.

Diphtheria antitoxin is a standardized blood serum of *immunized horses.* The average antitoxin contains about five hundred units to the cubic centimeter. The higher concentrations deteriorate quicker than the lower. A small amount of preservative is added to the marketable varieties. The average stock antitoxin keeps its strength for about a year.

A fact to be noted is that the diphtheritic antitoxin has little or no bactericidal properties. It simply neutralizes the specific diphtheria toxin floating in the circulating blood or loosely combined with the cell plasma. It confers immunity and is used up by its equivalent of toxin. The dose theoretically has no connection with the age or size of the patient but simply with the amount of toxin present.

Foreign serums introduced into the blood stream may or may not produce vital changes. A few cases on record however show that the introduction of horse serum into the human circulation may *very rarely* cause death either instantaneously or within a few hours. More often occur rashes, temporary sharp rises of temperature, rheumatic pains throughout the body or attacks of syncope. Again if large quantities of antitoxin are given to very young children the amount of preservative contained therein may reach a sufficient quantity to produce symptoms.

A passive immunity can be established temporarily in exposed persons by an injection of antitoxin. The quantity needed is less than that used for curative purposes. The earlier antitoxin is given, the greater its effect and the smaller the dose required. When several days have elapsed before antitoxin is administered, large doses should be given on the supposition that some of the toxin already in loose combination with the cell plasma can be extracted and neutralized by a sort of mass action on the part of the antitoxin. Where the use of antitoxin has been delayed over four days its effect on reducing the mortality is very slight.

Antitoxin is usually given hypodermically in an area where loose areolar tissue abounds and where the local reaction will give least incon-

venience, i. e., the outer side of thigh, side of the abdomen or between the shoulder blades. In critical cases intravenous injections may be made. The administration of the serum by mouth or rectum is very unsatisfactory.

Diphtheria Toxin-antitoxin

Toxin-antitoxin is an immunizing agent.

The first attempt to immunize children by means of diphtheria toxin-antitoxin was made by Behring. Doctors Park and Zingher of the New York Health Board have investigated the efficacy of this method and summarize their findings as follows:

Our results in active immunization up to the present time have led us to the conclusion that, while the toxin-antitoxin injections cannot be depended upon to prevent diphtheria in the presence of immediate danger of infection because of the slow development of immunity in a majority of the cases, yet the injection is of value in rendering a community or school population immune to the danger of infection from future exposure up to a period of possibly several years.

1. Individuals who, before treatment, give a negative Schick reaction are immune probably for life and, therefore, it is not necessary to inject them, when exposed, either with antitoxin or toxin-antitoxin.

2. Those who give a positive Schick reaction and are exposed to diphtheria and in immediate danger should receive either antitoxin alone or, if a longer protection is desired, both antitoxin and toxin-antitoxin.

Dosage of Antitoxin in Diphtheria

(*Recommended by the New York City Health Board*)

	Mild Cases	Moderate	Severe	Malignant
Infants, 10 to 30 lbs. in weight [(under 2 years of age)	2,000 units to 3,000 units	3,000 units to 5,000 units	5,000 units to 10,000 units	10,000 units
Children, 30 to 90 lbs. in weight (under 15 years of age)	3,000 units to 4,000 units	4,000 units to 10,000 units	10,000 units to 15,000 units	15,000 units to 20,000 units
Adults, 90 lbs. and over in weight	3,000 units to 5,000 units	5,000 units to 10,000 units	10,000 units to 20,000 units	20,000 units to 40,000 units

Cases of laryngeal diphtheria, moderate cases seen late at the time of the first injection, and cases of diphtheria occurring as a complication of the exanthemata should be classified and treated as "severe" cases.

In all cases a single dose of the proper amount, as indicated in the schedule, is recommended. For immunizing purposes a dose of 1,000 units should be used.

3. For the general prophylaxis against diphtheria in schools and communities, excluding immediate contacts, a mixture of toxin-antitoxin alone (from 85 to 90 per cent of the L + dose of toxin to each unit of antitoxin) or toxin-antitoxin plus vaccine of killed diphtheria bacilli is recommended. The dose is 1 c.c. of toxin-antitoxin and 1,000,000,000 bacteria injected subcutaneously and repeated three times at intervals of six or seven days. Sufficient time has not as yet elapsed to judge the value of adding the injections of the bacilli to the toxin-antitoxin.

The Research Laboratory will supply those connected with institutions, who

are interested in the subject of active immunization against diphtheria, and are willing to furnish us a report of the cases, diphtheria toxin for the Schick test and a mixture of diphtheria toxin-antitoxin for immunization.

In treating cases the injections may be repeated at four, eight, twelve, twenty-four hour intervals, as seems necessary. It must be remembered that any effect is rarely produced in less than twelve hours and the full effect is not manifested for about thirty-six hours. *Prophylactic injections* are protective for about three weeks.

It is to be noted that one large dose, other things being equal, is better than repeated smaller ones, because there is more time for the antitoxin to work before the system creates its own antitoxin.

Prophylaxis

Diphtheria patients must be isolated. Exposed children should receive an immunizing injection of 1,000 units antitoxin.[1] Rules for *isolation, quarantine, disinfection, school restriction,* etc., are given in the forepart of this section. (*See also* Nasopharyngeal Toilet, Section I.)

Management of the Common Varieties of Diphtheria

The patient should be isolated in a well-ventilated room and subsist on a soft fluid diet with a liberal supply of water and fruit juices. A laxative water or a soapsuds enema should be given at the outset.

The most common variety of diphtheria is that which originates on the fauces and tonsils with or without secondary involvement of the nasal cavities, larynx and trachea. Primary nasal and laryngeal diphtheria is not as frequent.

In all suspected cases cultures should be taken and a smear examined to clear the diagnosis. One negative finding means little if the clinical symptoms are positive.

I have had cases in which on the third culture the Klebs-Loeffler bacilli were found, and this culture was taken on the sixth day of the disease, when the patient had practically recovered, having received five thousand units of antitoxin.

In suspected cases an appropriate dose of antitoxin should be given at once even before the diagnosis is clinched, because time is such a valuable asset in this form of treatment.

After the diagnosis, *diphtheria,* is established antitoxin should be administered every twelve or twenty-four hours, until the local process is stationary and the constitutional symptoms are less pronounced (*see* Antitoxin).

[1] Immunization with a homogeneous antitoxin has been suggested by Behring. It occasions no sensitization and protects for one year, but it cannot readily be obtained.

Auxiliary and Symptomatic Treatment

Local treatment of diphtheria must be *mild*. *Swabbing* the throat in diphtheria is harmful. The best way to cleanse the nasopharynx is by means of the nasopharyngeal toilet. (*See* Bedside and Office Technic, Section I.) In septic cases a blunt piston syringe may be used, and the stream is to be directed *horizontally—not upwards*—as the child lies on his side. For most cases instillation by means of a spoon will suffice. If bleeding follows an irrigation, syringes should not be used. If membranes clog the nostrils, a small flexible catheter can be attached to the irrigating syringe.

Liquids.—The following liquids may be employed:

Salt water—one teaspoonful to the pint

Boric acid water—2 per cent

Labarraque's solution in water—1 to 20

Ichthyol in water—2 per cent

Permanganate of potassium (rose colored solution).

Medication.—Digestion.—As an aid to digestion the following mixture is efficacious:

Fairchild's essence of pepsin.....	60,0 ℥ii
Acid Muriat dilut.....	2,0 ℥ss

S. A teaspoonful four times a day.

In septic cases five drops of the tincture of chlorid of iron may be given every four hours.

Fever.—Fever can be reduced by warm tub baths and cool sponging. In cerebral unrest an ice cap is advisable. One or two doses of phenacetin (gr. 3 to 10) will reduce high temperatures for a few hours and will do no harm.

Vomiting.—To check incessant vomiting, one to two drops of tincture of iodin in sweetened peppermint water may be given every hour.

Diarrhea.—A moderate diarrhea need not be checked. When severe diarrhea sets in a "binding diet" must be instituted (*see* Bedside and Office Technic, Section I), and a few grains of Dover's powders may be given.

Albuminuria and Nephritis.—In albuminuria and nephritis warm baths should be relied upon to promote diaphoresis. In nephritis with dropsy an infusion of digitalis is indicated.

Convulsions.—*Initial convulsions* indicate intense infection for which an enema, a warm bath, and a few doses of chloral hydrate and potassium bromid are to be given.

Terminal convulsions denote circulatory failure and cerebral inanition,

for which active stimulation is called for (camphor, enteroclysis at 110° F.).

Dry Tongue.—The discomfort from a dry tongue can be relieved by applying equal parts of rose water and glycerin.

Pseudomembranous Conjunctivitis.—This condition usually yields to ice compresses and a boric acid spray.

Otitis Media.—In otitis media the ear should be cleansed with warm boric acid water. The drum membrane may require puncture.

Hemorrhage.—*Hemorrhage from sloughing of the tissues* may subside if alum water is instilled through the nose.

Severe hemorrhage requires locating the bleeding spot and cauterizing with the actual cautery and eventually blood transfusion.

Phlegmon and Induration.—Phlegmon and induration of the tissues of the neck require surgical aid.

Postdiphtheritic Paralysis and Ataxia.—The therapeutic requirement for paralysis of the soft palate and ataxia are: fresh air, baths, massage, the faradic current and strychnin (gr. 1/30) three times a day by mouth or subcutaneously. Feeding by gavage may be necessary.

Gradual Paralysis of the Respiratory Muscles.—Gradual paralysis of the respiratory muscles including the diaphragm is a serious condition but may improve under stimulation and artificial respiration and careful feeding.

Cardiac Arrhythmia.—In cardiac arrhythmia absolute rest, judicious feeding and stimulation are to be employed. Sudden death from heart paralysis gives no chance for treatment.

Anemia.—Anemia, which often follows in the wake of infectious diseases, demands fresh air, protofer.

Stimulation.—Stimulants should be administered in good time.

By Mouth.—Whisky or brandy in water
California wine
Champagne
Strong coffee and tea

Hypodermically.—Camphor gr. ii to v in oil (0,12-0,3)
Digipuratum in sterile solution (ampules)
Strychnia gr. 1/30-0,002
Caffein sodium benzoate gr. ii to v (0,12-0,3).

By Enteroclysis and the Drop Method.—This is feasible and efficacious. A physiological saline solution to which whisky can be added is usually employed.

Diet.—The food must be nutritious and digestible, such as milk, matzoon, beef tea and egg, eggnog, custard, ice cream, water ices, soups, broths, cereals, cocoa, coffee, tea, punch, pineapple or orange juice.

Nourishment is best given when the temperature is low. Rectal alimentation and gavage may be necessary.

Serum Sickness

Not infrequently certain disagreeable clinical manifestations occur several days after the administration of blood serum. There may be various types of skin eruptions, fever, edema, joint pains, etc.

Attempts to prevent the ordinary form of serum disease by giving a preliminary injection of 0.5 c.c. and a full dose several hours later or by administering a physiological dose of atropia sulphate, have not given satisfaction.

The benefits of diphtheria antitoxin outweigh the minor discomforts to such an extent that physicians will not hesitate to use the remedy freely.

Anaphylaxis and the Author's Scratch Tests

(*Hypersusceptibility*)

A definition of Anaphylactive Phenomena and Shock and a description of the author's Scratch Test for detecting hypersusceptibility will be found in the chapter on Bedside and Office Technic.

Until the question of anaphylactic shock in human beings is definitely settled, immunizing injections of serum should be resorted to only for the purpose of limiting an epidemic or for protecting exposed individuals who cannot be protected by isolation; or better still, *immunizing injections should be made with a serum other than that which comes from the horse.*

Schick's Test for Susceptibility to Diphtheria.—A practical method for determining whether or not a person is susceptible to diphtheria has recently been devised by Schick while working in von Pirquet's clinic in Vienna. The reaction depends on the local irritant action of minute quantities of diphtheria toxin when injected intracutaneously, in the absence of antitoxin.

The modus operandi of this test is given in the chapter on Bedside and Office Technic.

Treatment for Diphtheria Carriers

Diphtheria carriers are best treated by spraying the throat with a formalin solution one-fourth of one per cent of the officinal solution, and by instilling argyrol (25 per cent) or protargol (5 per cent) into the nose once or twice a day.

A *very mild* chlorin water spray may also be employed. Insufflations of *kaolinum* (fuller's earth) into the nose and throat twice daily are recommended.

Erysipelas

Organism.—Erysipelas is an acute infectious process in the skin produced by the Streptococcus of Fehleisen, which is akin to but probably not identical with the Streptococcus pyogenes.

Symptoms.—The affected area is raised, brawny, due to the firm fibrinous exudate, and purplish red. Usually there is considerable tenderness to the touch. The face is the most frequent site of this disease and it often starts at the nasobuccal junction. If the serum exudate is abundant blebs or vesicles may form on the surface.

There may be slight general symptoms for a day or two, but usually the disease is ushered in by a sharp rigor, followed by a rise of one or two degrees of temperature and often nausea and vomiting. The toxemia varies in different cases but is usually marked; the pulse is rapid and may become feeble; the rash follows the initial symptoms in a few hours and spreads with more or less rapidity. Ordinarily it is limited to the exposed surface of the skin when occurring about the face and is restricted by the hair line, but in very severe cases the whole scalp may participate in the disease. The course of most cases covers a period of ten days or two weeks. The cases end by resolution and desquamation if favorable, or a fatal issue may result from exhaustion, toxemic or secondary complications such as pneumonia, nephritis or myocarditis. Relapses are not infrequent, due to a predisposition or a retention of the infective organism in the skin. Some cases present the rash without the systemic symptoms, and these run a very light course. In others the skin reaction is slight and the toxemia marked.

Prophylaxis.—In handling a case of erysipelas, rubber gloves should be worn by those in attendance. All abrasions, cuts, scratches or open wounds should be kept clean, covered or protected. This applies also to the navel and anogenital region of the newborn. Puerperal infection should be prevented by asepsis and antisepsis.

Treatment.—The treatment in general should be rest in bed, a light nourishing diet—in severe cases restricted to milk—stimulation, if the circulation gets feeble, and local antiseptic applications.

Both antistreptococcus *serum and vaccine* have been advocated—the latter especially for children where the disease occurs about the navel, and which is frequently fatal. It is a good plan to start with a dose of 50,000 organisms, and if the rash does not spread in the next twenty-four hours, to double it, and so on until a million or even more are given at a dose. The serum may be given subcutaneously or in urgent cases intravenously. The dose varies from twenty to one hundred c.c.

Lately better results have been reported by injecting the serum in a circle about the involved area. In desperate cases if one serum does not show any effect, obtain some from another source. In this way often surprisingly good results are obtained.

Hiss Leukocyte Extract in Erysipelas.—Favorable results have been reported from the use of this preparation which is injected subcutaneously.

Local Scarifications.—If the erysipelatous patch is not extensive,

the Kraske-Riedel method of surrounding the infected area with "fence rail" incisions into which a 1-1,000 mercuric bichlorid solution is rubbed is advised. The area so treated is then kept covered with moist bichlorid gauze. The incisions are made just deep enough to bleed slightly. The writer has employed this method a number of times with success as regards limiting the spread of the disease.

Local Applications.—Ice cold lead water or thirty-five per cent ichthyol vaselin are perhaps the most useful of the many applications recommended; good results are also claimed for 95 per cent alcohol, or a saturated solution of magnesium sulphate. In severe cases pure carbolic acid may be painted around the eruption in the shape of a narrow band. As the skin whitens it is to be painted with pure alcohol to prevent deep burns.

Medication.—The bowels should be opened by a brisk cathartic and kept open. The patient should have an abundance of cool water and fresh air all the time.

Iron in some forms has long been looked upon as almost a specific. A way of administering this is as follows:

℞ Sodii salicylat..... 2,0 ℥ss
Liq. ferri perchlorid..... 4,0 ℥i
Glycerin ..... 15,0 ℥iv
Aq. .....ad 120,0 ℥iv
One tablespoonful every two hours

Erysipelas of the female genitals during the puerperium requires especial treatment. There are practically three types. The first is that chiefly involving the external genitals and the adjacent skin, the treatment of which differs little from what has gone before. The second form is erysipelas of the vagina, for which topical applications of a 1 to 1,000 solution of bichlorid of mercury in forty per cent alcohol and later the use of twenty per cent argyrol solutions are appropriate. Douching should be avoided, but a gauze wick soaked in some mild antiseptic solution may be left in the vagina in order that drainage may be favored. The last form is really a pelvic cellulitis and is known as erysipelas interna, and usually terminates in a thrombophlebitis of the pelvic veins. It may require surgical intervention. The only other treatment is supportive and with serums. Douching and colon irrigations probably do more harm than good.

Mortality.—The mortality of the ordinary forms of erysipelas is about five per cent but in the puerperal variety it may reach as high as forty per cent. The only preventive is cleanliness and isolation of cases.

Glanders—Farcy

Etiology.—Glanders is a disease of horses, asses and mules, but transmissible to other animals. It is produced by a special Gram-positive bacillus discovered by Löffler, which he named the Bacillus mallei. It produces two forms of disease in horses, one attacking the nasal mucous membrane and called *glanders,* the other a skin infection quickly invading the lymphatics and known as *farcy.* The tendency of the germs is to cause the production of granulomata which subsequently break down and become purulent.

Clinical Course.—The disease may be acute or chronic in either form. The acute cases are very fatal and fifty per cent of the chronic cases die of exhaustion.

In man the affection usually starts on exposed surfaces of the skin, the conjunctivae or within the nares. In acute cases the disease manifests itself by ulceration at the site of inoculation and secondary involvement of the lymphatics and internal organs. A vesicular eruption resembling smallpox may cover the body. These cases are usually fatal. The only treatment consists in relieving the patient of his pain and keeping up his strength as long as possible.

Treatment.—The results of the use of vaccines or serums have not been particularly encouraging thus far. A few observers have reported favorably on the use of vaccines in horses prophylactically and claim for the serum of animals so treated an antitoxic power.

The treatment of chronic glanders in man is surgical. Wherever breaking down occurs, free incision, curettement and the application of strong antiseptics are indicated. Ulcers should be cleaned and strong antiseptics applied. Lesions within the nose should be cauterized with pure lactic or trichloracetic acid and mild antiseptic douches should be frequently used. All forms of internal medication have been advised, particularly the iodids, mercury, arsenic, and the salicylates. *Prophylaxis* is the most important part of the treatment of this condition.

Prophylaxis.—All suspected animals should be tested for the mallein reaction, which is similar to that of tuberculin, or by the complement fixation test. Diseased animals should be killed and cremated and their stalls destroyed. Human cases should be isolated and if possible sent to the seashore. The excreta are infectious as also everything used about the patient and should therefore be properly disposed of.

Prognosis.—The duration of chronic cases may cover a period of several years and result in either death or recovery. Death may result from pyemia. Acute glanders is fatal in a large proportion of cases, usually within two weeks.

Glandular Fever

Drüsenfieber of Pfeiffer

Glandular fever is a disease presenting enlargement of the lymphatic glands—especially of the cervical region, with fever and gastro-intestinal derangement. It occurs in epidemics. The etiological factor is unknown and the treatment is symptomatic. From what has been observed in the past the contagium evidently enters through the tonsils or gastro-intestinal tract. There is a possibility of the infection being inhaled. After the disease has subsided a chronic enlargement of the glands may persist.

Treatment.—Quinin and calomel have been reported as favorably influencing the disease. Locally the glands may be painted with tincture of iodin or an ichthyol ointment may be applied.

The throat should be gargled or sprayed with antiseptic solutions and a ten per cent solution of argyrol instilled into the nostrils. The diet and general treatment follows that for fevers.

Prophylaxis depends on oral hygiene and the avoidance of "carriers" in times of epidemics.

Influenza

Influenza is produced by the Pfeiffer bacillus and occurs in pandemics and sporadically.

Except during the prevalence of the disease the common "cold" so often called influenza, is not associated with the specific germ.

Clinical Course.—Clinically the disease starts frequently as a "cold," and always in true cases there is some catarrh of the respiratory passages. The germs usually remain localized in the upper respiratory tract but they create toxins which affect the entire organism. Occasionally the bacillus gets into the blood stream and causes a secondary meningitis, encephalitis, endocarditis or pneumonitis.

Influenza in some of its clinical manifestations may resemble muscular rheumatism, neuritis, acute depressive psychoses, and gastro-enteritis. Combinations of these symptoms also occur. The incubation period is usually three or four days. The onset is sudden with rapid rise of temperature, rigor, vomiting, severe frontal headache, prostration out of all proportion to the other symptoms, loss of appetite, sometimes delirium and a general catarrhal condition of the conjunctiva and respiratory passages. The duration in ordinary cases is seven or eight days and resolution is usually rapid, but recovery from the prostration is slow.

Relapses are not infrequent. The mortality ranges from three to forty per cent in different epidemics. Death is usually caused by complications rather than by the primary effect of the disease.

Pneumonia, myocarditis, nephritis and affections of the central nervous system are frequently fatal complications.

Infection takes place regardless of age, sex, and conditions but very young children seem to escape more often than others.

Clinical Forms of Influenza.—These are the respiratory, gastro-intestinal, toxic or septic, nervous and hemorrhagic forms.

Prophylaxis.—The only satisfactory prophylaxis is getting away from the neighborhood where the disease occurs.

Patients may be isolated and discharges should be burned or disinfected.

Treatment.—The treatment must include such points as were given in the article on Infectious Coryza, or Bronchopneumonia, and besides special care must be given to the support of the heart—for which purpose caffein, strychnin and alcohol are best. The diet should be fluid or semi-solid, and all the excreting organs must be kept active.

A single initial dose of calomel jalap and quinin, āā gr. v. (0,3), in wafer form, may be given to an adult. Children may take three grains of calomel and three grains of jalap in syrup or jam, and subsequently three grains of quinin in a teaspoonful of compound elixir of taraxacum.

To promote diaphoresis Dover's powders and phenacetin are serviceable. Aspirin and sodium salicylate are given on account of their alleged specific action in acute infections.

Specific Therapy in Influenza.—Stock vaccines are now available and may be employed in severe cases.

Blood serum from influenza convalescents suggests itself as a specific therapeutic agent and may be administered subcutaneously in septic cases.

Fever is best controlled by means of warm or hot baths. Influenza patients usually object to cold water applications.

The nasopharyngeal toilet should be employed throughout the acute and convalescent stage of the disease, and so long as the tongue remains coated *dilute hydrochloric acid* should be administered several times a day in water.

In toxemia with circulatory failure camphor in oil, liquid digipuratum in sterile ampules, should be given hypodermically. Enteroclysis at 110° F. or venous infusion of a saline solution are stimulating measures of great value.

Hemorrhages from mucous membranes from the kidneys or into the skin are occasionally observed in the septic form of influenza for which the hypodermic injection of coagulin, obtainable in sterile ampules, or the hypodermic injection of whole blood from any donor in good health is indicated. (*See* Bedside and Office Technic.)

Cerebral Unrest and Insomnia.—Cerebral symptoms due to toxemia call for warm baths and for the administration of bromural, gr. 5 to 15, chloral hydrate, gr. 10 to 20, and hyoscin, gr. 1/100.

The Convalescent Stage.—During the convalescent period all rational

tonic measures, including a change of climate, are demanded with a view of safeguarding against relapses and complications. Numerous *complications* may set in and should receive prompt recognition and the proper management.

Influenza Pandemic of 1918 ("the Flu")

Of the pandemics of influenza recorded in history the one of 1918 was by far the most serious from the standpoint of its extent and the virulence of the infection.

Although popularly called Spanish influenza, the origin of the pandemic is still undetermined. Some investigators believe its origin to have been in Spain while others trace it back to China. Frost, however, believes that, unlike the previous pandemics, the one of 1918 started from many centers at one time, its universal spread resulting from the unusual amount of travel incident to the World War.

It is also questioned by some authorities as to whether the influenza bacillus was the organism responsible for the infection. Some think it likely that the condition was not one of influenza at all but may have been a modified form of pneumonic plague.

The features that particularly characterized the disease in its pandemic form as compared with the ordinary form of influenza were the high death rate, the great tendency to complications, especially bronchopneumonia and encephalitis lethargica. Pregnant women succumbed very readily to the disease.

It is estimated that the number of deaths in the United States caused by the disease during the pandemic was about 600,000. The over-crowding in army camps, the shortage of doctors and nurses and the general psychologic depression brought on by the war undoubtedly were responsible to a great extent for this tremendous loss of life.

Treatment during the pandemic was in no way different from that of the ordinary form of influenza.

Leprosy

Etiology.—Leprosy is usually attributed to an infection with an acid-fast bacillus, resembling the tubercle bacillus.

We know that the disease has a very long period of incubation, extending from months into years, that human beings appear to be its only host, and that the portals of entry are probably lesions of the upper respiratory tract and the skin.

Geographically leprosy thrives best in tropical countries and in certain low lands near waterways. This latter fact has led, but probably without reason, to the assumption of the ingestion of large amounts of fish as a predisposing cause.

Clinical Course.—For a year before active symptoms develop the

patient frequently complains of being run down and debilitated. A peculiarly suspicious sign in regions where the disease is endemic is recognized in a moderate induration of the superciliary ridges with slight brownish pigmentation and brownish discoloration of the cornea.

Tubercular and Neurotic Types.—The disease follows one of two types, namely, the tubercular or the neurotic. Both are ushered in by a macular rash and usually febrile disturbances. In the further course of the tubercular type the macules become indurated and granulomas are found. After they reach a certain stage of development an arrest of growth takes place and the disease and condition of the patient remain stationary. At short intervals attacks resembling the initial one occur, fresh crops of tubercles form and when arrest again occurs the patient shows a distinct advance in the course of the disease. After a time a chronic cachexia becomes evident and more or less nerve involvement, as shown by neuralgias, anesthesias, muscular paresis and degeneration. Trophic disturbances also occur and ulceration of the nodules or exposed parts of the body. The eyes may be invaded and blindness ensue. Invasion of the cornea can be prevented for some time by creating a barrier of scar tissue at the periphery by the operation of keratotomy. The larynx may become diseased and stenosed, making a tracheotomy necessary. The soft parts of the nose are sometimes completely eaten away but the bone is not involved. This type of the disease usually lasts on an average about eight and one-half years.

In the *nervous type* the rash may soon fade but the nervous involvement is shown by marked neuralgias followed later by anesthesia and secondary paresis. The loss of sensation results in many wounds and injuries received unconsciously, with subsequent deformity of limbs.

This form of the disease lasts as a rule longer than the other and may burn itself out as it were in the course of fifteen or twenty years, leaving a cripple.

It is said that a prognosis of the type of disease to follow can sometimes be made from the initial rash, as in the tubercular type it does not occur in scalp, trunk, sexual organs, palms of the hands or soles of the feet, while in the anesthetic type the scalp is the only immune area. Almost all cases of the tubercular variety are fatal, but occasionally a transition occurs into the nervous type. It is generally considered that the tubercular variety represents a fresh virulent type of infection while the nervous form is produced by a decadent strain of the organism. However this may be, fewer organisms are found associated with the latter as compared with the former condition. The pathology in the nervous tissues of both forms is one of degree.

The first manifestation is a peripheral neuritis of the sensory nerves followed later by degeneration and infection of the central nervous system and secondary involvement of the motor roots. The nerves most frequently

involved first are the ulnar, median, radial, musculocutaneous, intercostal, humeral and the perineal.

That some cases have clinically gotten well is without doubt, but whether treatment materially aided this result is difficult to say.

Prophylaxis.—The disease is moderately contagious, but not to the extent that is believed by the lay people. Very intimate relations seem to be required for transmission of the disease. The bedbug was supposed for a long time to be a powerful agent in distributing the infection, but later investigations discredit this. About all that can be said at present is that strict isolation should be practiced in localities where the disease is endemic and a fair amount of general care taken elsewhere.

The patient should be isolated with special toilet necessities and special eating utensils. Persons with open wounds should not attend a leper and absolute cleanliness should prevail throughout.

A few lines of treatment have apparently produced favorable results, and good hygienic surroundings are as important with this as in any other infectious disease.

Treatment.—Serum treatment has been disappointing. Babes and Koch have elaborated a *leprin* in the same manner in which Koch produced tuberculin. It is injected hypodermically and the results are said to be encouraging.

The use of *tuberculin* and *Calmette's antivenin* is mentioned in the literature on *Leprosy.*

Strychnin, salol, sodium, salicylate and arsenic are said to have a favorable influence on the disease when given internally.

Locally the application of ichthyol, resorcin, pyrogallol, chrysarobin and formalin, the application of the x-ray and surgical measures may relieve to a great measure the distressing symptoms. The removal of the patient to a non-infected locality often produces beneficial results.

Chaulmoogra oil, obtained from the seeds of the gynocardia odorata, is given internally in doses ranging from 0,3 to 6 grams three times a day, in capsule, milk or emulsion. It is very irritating to the stomach, and this effect has lately been overcome by using either a magnesium or saline salt of its active principle, gynocardic acid. This is given in doses ranging from 0,03 to 0,2 grams three times a day. A favorable effect has also been induced by using the oil locally made up in a 50 per cent ointment with lard. This preparation should be rubbed into the skin for about two hours daily. The effects it is said to produce in favorable cases are increase of perspiration, decrease in the size of the nodules, improved appetite, lessening of anesthesia, greater suppleness of skin, and lessening of the pain in the joints.

Segregation should be compulsory except in cases in which provision can be made in the home for complete isolation.

Malaria

Etiology.—Malarial fever is due to the presence in the blood of several varieties of plasmodia.

Within the family of malaria-producing plasmodia are grouped at least three varieties of this organism. The one we are most familiar with is known as the *tertian variety,* or Plasmodium vivax. It enters the blood stream, as in fact do all the other varieties, through the bite of an infected female mosquito of the genus Anopheles. So far as we know at present this is the only means of acquiring the disease among human beings.

The parasite at first appears as a small irregular protoplasmic mass which passes quickly out of the plasma into a red blood cell; here it grows and acquires pigment from the hemoglobin of the cell. After a time the organism becomes full grown and segments into spores. The red cell ruptures and the spores find their way into the plasma again to infect other red cells. This is known as the *asexual cycle* and may go on indefinitely.

In the *tertian variety* the cycle occupies forty-eight hours and so produces a new crop of plasmodia every third day, which is manifested clinically by the malarial chill.

The quartan type of fever is produced by an organism, which requires seventy-two hours to pass through this cycle, bringing the chill on every fourth day.

The *estivo-autumnal* form is caused by an organism smaller than the rest, which produces only a few spores, is finely pigmented and has an irregular developmental period.

So far nothing has been said of the *sexual forms* of these various types. Ordinarily the parasites do not propagate in the human host, but when taken up by a mosquito become active in the insect's stomach. The male form has flagella which break off from the main part of the organism and float free in the surrounding fluids until they meet a female organism which they enter and impregnate. The impregnated female burrows into the wall of the mosquito's stomach and lodges there, when it matures and segments, forming a cyst which finally ruptures into the body cavity. The small segmental forms finally reach the salivary glands when they are in a position to infect a human being, should the mosquito bite one. In the estivo-autumnal form of malaria the sexual organisms are peculiar in being of a crescentic shape.

Clinical Course.—The *chill* is usually preceded by a period of depression, headache, nausea and general malaise which may occupy a period of a few minutes to two hours. This is followed by the chills proper which occur in rapid succession or may be protracted for a period of half an

hour to an hour. The internal temperature rises throughout the attack but the patient complains bitterly of cold and shakes violently. At the end of about an hour the chills cease, fever sets in and the patient complains of "burning up." This may go on for from one to ten hours or more, when a perspiration breaks out, the fever subsides and the attack is over.

The attacks come at intervals of a day in the tertian variety and of two days in the quartan, providing there has been a single infection. Double infection of the tertian and triple infection of the quartan variety may cause a quotidian type of fever. A double quartan infection produces two days of fever and one day free.

Inoculations which succeed each other start independent cycles so arranged that the attack in one overlaps the interim of the other. As the Anopheles only appear at night, a day usually elapses between succeeding infections.

The estivo-autumnal variety is irregular in its time of maturation so that the fever it produces is usually more or less continuous for a period of two or three weeks—when nature practically conquers the disease, or before, if proper treatment is instituted. The disease usually starts with a chill, but from that time on the temperature may remit but does not fall to normal and the secondary rises are not associated with distinct rigors. In the worst forms of this estivo-autumnal variety there may be grave gastro-intestinal symptoms, oppression and dyspnea, delirium or collapse and large subcutaneous and internal hemorrhages.

All cases may develop a chronic cachexia associated with anemia, enlarged spleen and changes in other organs.

Prophylaxis in Malaria

As the mosquito is the only known channel of infection and the female Anopheles the especial culprit, our first point of attack should be in this quarter. The insect breeds from larvae incubated in stagnant water and marshy districts and to a less extent in such artificial culture grounds as cisterns, privies, rain barrels, roof gutters, etc., where a favorable environment is found.

Filling in or draining marsh land, clearing away low verdure, destroying or protecting from access favorable breeding places, and floating oil on stagnant water are all measures calculated to ged rid of the pests. Then the insect cannot transmit the disease if it does not acquire it, so that by screening off all acute cases and treating chronic ones the amount of infection can be reduced. Next, as the Anopheles only appear at night in open country, infection can be limited by cultivating the habit of remaining indoors after sundown, where protection by screens may be maintained. Further protection is afforded by keeping bedrooms dark, as the insects follow the light, and sleeping when possible in the upper stories,

as the mosquito usually does not rise above twenty feet. When going out protection may be given by high boots, gloves and veils to exposed parts. Japanese punk, oil of lavender and other odoriferous preparations are supposed to be obnoxious to mosquitoes and may keep them away, but usually the effect is not marked. Oil of citronella is sometimes applied to the body for the same purpose but with varying success. Quinin salts may be taken as a prophylactic once a week by persons living in malarial districts.

New York Health Board Instructions

The Health Board of New York has issued the following lucid instructions regarding the prevention of malaria which embody our present knowledge of the subject:

This disease, which is also called "ague," "chills," "chills and fever," and "dumb ague," has been thought due to stagnant water, to upturned soil, to bad air, and to other causes. It has now been proved beyond doubt that it originates from the bite of a certain kind of mosquito (*Anopheles*) and as a rule *in no other way*. This mosquito is not created with malaria, but gets the germs into its stomach by biting a person already infected. After the lapse of about eight days, such a mosquito becomes capable of infecting other persons, previously healthy, by its bite, thus passing the disease on indefinitely.

To prevent malarial disease, therefore, we must either destroy the dangerous mosquitoes or avoid their bites. In practice, both expedients are desirable. As the malarial mosquitoes bite as a rule only at night, one will usually be safe by protecting the bedroom, either with screens at the windows or with a mosquito bar carefully arranged over the bed. Before going to bed one should kill all the mosquitoes resting on the bedroom walls, in the closets, or under articles of furniture, as the insects already in the room are most apt to give trouble. Moreover, all cases of malarial disease already developed must be carefully isolated under mosquito netting until pronounced by a competent physician to be cured. Otherwise, malarial mosquitoes biting these persons, and flying out of doors again, may carry the infection some distance in all directions. Various epidemics in our suburbs, in past summers, have been thus begun.

The other and still more important measure is to *prevent the breeding* of mosquitoes in one's neighborhood. All mosquitoes, the malarial as well as the common household pests which only annoy us, require standing water to lay their eggs in. Mosquitoes will lay in water barrels, pans, tin cans, wells, springs, rain pools, cesspools, pots, kettles, drainage traps, ponds—in short, anywhere where stagnant water is found. Running streams are not apt to support the young, unless the current is sluggish. Large bodies of water are usually kept clear by the small fish in the water —minnows, small sticklebacks, sunfish—except when the margins of the

water are encumbered with grass, slime, or leaves, preventing the fish from getting at the mosquito larvae, which are very expert at hiding. Mosquitoes, as a rule, cannot live in salt water. To kill the mosquito larvae, therefore, the rule is simple: *no standing water*. Where standing water *must be had* for washing or drinking, the top of the receptacle should be closely covered with wire gauze—not the smallest opening being left at the margin. When drainage cannot be made possible, the surface of the water should be covered with a film of kerosene oil. The oil may be poured on from a can or sprinkler. It will spread of itself. One ounce of oil to fifteen square feet of water is enough. The oil must be renewed about once a week during the mosquito season. A solution containing 1 pound of sulphate of copper and 1 pound of unslaked lime in 10 gallons of water will cause the death of mosquito larvae when added in the proportions of one gallon of solution to 50 gallons of infected water.

Mosquitoes do not fly far from their breeding places, and if all the householders in a given neighborhood will observe the simple rules given, experience has already amply proved that the results will be amazing. Persons keeping stagnant water on their premises are guilty of maintaining a nuisance, and it is the purpose of the department to proceed against all who neglect the warning of the department in this respect. Where large bodies of water, the drainage of which is too expensive for private enterprise, are in question, the department hopes to enlist the assistance of the proper city authorities, so that there need be no reason why the plague of mosquitoes and malaria in the suburbs of New York should not be entirely removed.

The Infection of Young Children.—A most important fact which was independently observed by Koch in Africa, is that in a native population in a malarious region, while the adults may be perfectly free from the disease, an enormously large percentage of the young children contain the parasites in their blood. Though the disease appears to be much less dangerous to the native children than to the newly arrived, implying that they have a degree of congenital immunity, the parasites in the young natives are perfectly efficacious in causing dangerous fever in white people, when conveyed to them by mosquitoes. Hence the important practical inference that white people settling in a malarious tropical region should not, as they now commonly do, plant their houses near native settlements, but place them at some considerable distance from them, about a quarter of a mile being apparently sufficient. Christophers and Stephens in their last communication have gone so far as to express the opinion that the following of this simple rule would go very far indeed toward rendering the malarious tropics healthy for Europeans.

The routine administration of quinin to the malaria bearing native population in order to avoid the infection of new broods of mosquitoes is, in most regions, beyond possibility. But a combination of these methods

and the general use of mosquito netting is bound to yield good results. Sooner or later we shall find some plant that will prevent the breeding of mosquitoes or some innocuous gnat which will displace the dangerous Anopheles.

Symptoms.—The symptoms differ according to the species with which the individual is infected. A paroxysm of fever has four stages: premonitory symptoms, chills, fever, and sweating.

The *premonitory symptoms* are headache, languor, nausea and vomiting, yawning, and a feeling of cold.

The *Chill.*—The patient shivers and shakes, the skin is cool, pale, or cyanotic, the pulse is rapid, small, and hard, and the temperature rises rapidly.

The *Hot Stage.*—The skin becomes hot and flushed, the eyes are injected, there is headache, sometimes with active delirium, the pulse is full and bounding, the temperature reaches its maximum—105°, 106°, or 108°, and the fever drops in from six to eight hours by crisis.

The *Stage of Sweating.*—Sweating sets in as the temperature falls, and all the other symptoms rapidly disappear. The duration of the paroxysm is from eight to twelve hours, and the paroxysm returns with free intervals of one or more days. Herpes labialis is a common occurrence in malarial fever.

Course and Termination.—After the disease has lasted for about two weeks the patient may get well without any special medication. A persistence of the fever leads to anemia, to jaundice, and ultimately to chronic cachexia.

Diagnosis.—The diagnosis is established by means of a blood examination, also by the *therapeutic test,* i. e., the administration of repeated full doses of a quinin salt (gr. 5 to 15). That an intermittent fever is not malarial may be affirmed with almost absolute certainty if it does not cease after applying the therapeutic test for several days.

Differential Diagnosis.—It is clinically important to know that various diseased conditions are accompanied by an intermittent fever.

In *pyemia* or *concealed suppuration,* the chills, fever, and sweats occur at irregular intervals, the plasmodium is absent, and quinin has no influence.

In *tuberculosis* the therapeutic and blood tests are negative and tubercle bacilli are present in the sputum in pulmonary cases.

Pyelitis may closely simulate intermittent fever. We find in such cases pyuria, leukocytosis, a tender and swollen kidney, and no response to the therapeutic or blood test. Pyelitis may, however, be due to malarial infection.

Ulcerative endocarditis with an intermittent fever curve is recognized by the history, the clinical symptoms and physical signs, and failure to respond to the blood or therapeutic test. Ulcerative endocarditis with and

without choreic movements may follow in the wake of malarial infection in children and adults.

In *gall-stone colic* with chill and intermittent pyrexia the blood and therapeutic tests show negative results.

Typhoid Fever.—Remittent malarial fever may simulate typhoid fever very closely. In the absence of both the Widal reaction and the plasmodium test, a fever of over a week's duration which resists the action of quinin is usually typhoid or paratyphoid fever.

To distinguish *pernicious malarial fever* with jaundice from *yellow fever* we rely upon the blood test.

Clinical Varieties.—Intermittent malarial fevers, quotidian, tertian, quartan; remittent malarial fevers; pernicious malarial fever (algid, comatose, and hemorrhagic forms); malarial cachexia; dumb ague, or larvate malaria, the masked, irregular type.

Symptoms of Malarial Fevers.—The symptoms of malarial fevers differ according to the species of parasite with which the individual is infected.

Quartan Type.—The paroxysm, which may last from eight to twelve hours, consists of three stages, chill, fever, and sweating, occurring regularly every fourth day, with headache and pain in the back, nausea, vomiting, and diarrhea. Irregular or continued fever as a result of the infection with multiple groups of parasites may also be present.

Tertian Type.—The paroxysm occurs every other day. Infection with two groups of tertian parasites results in daily paroxysms.

The estivo-autumnal type, or remittent malarial fever, is a more severe type which occurs in temperate regions only at the height of the malarial season. The fever is irregularly intermittent, remittent, or continuous. Frequently the chills are absent and the fever resembles that of typhoid fever.

Pernicious Fever.—The malarial paroxysms may assume a malignant and fatal form with all the characteristics of an intense infection, including the comatose state. This type, like the remittent fever, is due to the estivo-autumnal parasite and is rare in temperate zones. In the *algid* form the onset is sudden with vomiting, watery diarrhea, and collapse. Sometimes there is anuria, and the patient may die from exhaustion with a subnormal temperature. The *comatose form* is accompanied by high fever and active delirium. Recurrent attacks are often fatal. In the *hemorrhagic forms* an acute hemorrhagic diathesis develops with subcutaneous ecchymoses and hemorrhages from any surface, and with all the symptoms of toxemia, such as jaundice, hematuria, hemoglobinuria, albuminuria, anuria, and uremia, and not infrequently death results.

Malarial Paroxysms with Long Intervals.—The intervals may be five or six days or even weeks, may occur in all three types of infection, and are due to the fact that many parasites are destroyed at the time of sporulation and a new incubation period must be passed through before the

number is sufficient to cause renewed symptoms. In all forms of malarial fever the spleen is generally enlarged.

Malarial Fever Cachexia.—The general symptoms are those of splenic anemia with breathlessness on exertion and edema of the ankles. The spleen is large and hard and the liver is often enlarged. The skin has a dirty yellow color and is sallow. The temperature may be normal or it may vary from 99° to 103°. The red blood cells may sink in numbers to one million. Retinal and other hemorrhages may occur.

Latency and relapse in intermittent fevers are clinical expressions of numerical fluctuations which occur in the successive broods of parasites in connection with conditions more or less favorable to their multiplication in the blood. During latency the slightest change in the condition of the host, such as exposure to cold, fatigue, and intercurrent disease, may give rise to a relapse.

The masked irregular types are a subacute form of malarial fever with malaise and various neuralgias, and they are oftener seen in children than in adults.

Complications of Malarial Fever.—In about ten per cent of cases we observe complications in malarial fever, involving the gastro-enteric, respiratory, circulatory, urinary, and central nervous systems and the organs of locomotion, particularly shown by jaundice, cardialgia, and enteralgia, pain in the muscles and joints, wry neck, tendovaginitis crepitans, nephritis, and bronchopneumonia. *Trophic disturbances,* such as redness of the eyelids and corneal ulcers, have been observed by the author. *Paraplegia* is reported as a rare complication. *Bronchopneumonia* is a common complication in children. The writer has observed in a number of cases that *endocarditis, acute and chronic,* has followed in the wake of malarial fever.

Malaria as a complicating factor in other diseases may give rise to a development of misleading and grave symptoms, particularly in abdominal affections. Mild attacks of gall-stone, renal, and appendicular colic or indistinct ileocecal symptoms, with subsequent fever and chills due to a complicating malaria, are not at all of rare occurrence, and give rise to serious errors in diagnosis and treatment. The same is true of post-operative fever and chills; therefore the careful clinician will apply the blood test or therapeutic test before *advising an operation or a revision of an operation already performed.*

Prognosis.—In intermittent malarial fever the prognosis is favorable with proper treatment, and in remittent malarial fever it is usually favorable, although death may occur in severe cases. In pernicious malarial fever the mortality ranges from 20 to 25 per cent. In malarial cachexia the outlook is fairly good. The spleen gradually becomes reduced in size, but it may take years before the ague cake entirely disappears. When the heart valves or kidney tissue are damaged, the prognosis is tempered in accordance with such and other possible complications. The mortality

of malaria in malarious districts with a considerable population is large. Thus, Professor Celli says that the mean mortality from malaria in Italy is about 15,000 victims annually, and that about 2,000,000 cases occur in Italy each year. As the mean duration of malaria is generally long, sometimes infecting the individual for years, the loss of labor and of production and the expense entailed in dealing with the disease amount to several millions of francs. Furthermore, Celli says that, owing to malaria, about 5,000,000 acres of land remain uncultivated, with a resulting large economic loss. According to the very accurate calculations of Ricchi, the Adriatic Railway Company, with 1,400 kilometers of road and employing 6,416 men, spends on account of malaria alone 1,050,000 francs a year. In the Italian army, in the twenty years from 1877 to 1897, there occurred more than 300,000 cases of malarial disease. Finally, Celli says malaria annually costs Italy incalculable treasure.

Treatment.—Quinin is a specific for malaria without any preparatory treatment. Ten grains twice a day may be given for three or four days, then ten grains once a day for three or four days, then five grains once a day for a week. It matters little when the quinin is given. It should be given in solution or in a wafer or compressed tablet, not in a *gelatin capsule,* which often passes unchanged through the intestines. It may be given in suspension with the compound elixir of taraxacum or fluid extract of licorice. Quinin may be given hypodermically by using the soluble salt, quinin and urea hydrochlorid, in 5, 10, or 15 grain doses. The oleate of quinin and quinin suppositories are practically useless. The tannate of quinin lozenges are too weak to be of value as an antiperiodic. Certain precautions must be observed in the hypodermic use of quinin and urea hydrochlorid, to avoid cellulitis, slough, or abscess. The solution is to be thrown deep into the subcutaneous tissue, no drop is to be allowed to fall on the skin in withdrawal of the needle, and the point of puncture is to be sealed with tincture of iodin or iodoform collodion.

Euquinin is not so bitter as the ordinary quinin salts, and is more readily swallowed by children and not so readily vomited. It is given in the same doses as the sulphate.

After the paroxysms the following is serviceable to prevent relapses:

℞	Quininae sulph. Acid sulphur. arom. Solut. arsenical. Fowl.	āā, ʒi	4,0
	Syr. c. aurant.	℥i	30,0
	Aquae ad,	℥vi	180,0

M. S.: A tablespoonful twice a day after eating.

Or,

℞ Warburg's tincture with aloes, ½ oz. every morning after breakfast.

Or,

℞	Quininae sulph.....	ʒi	4,0
	Elix. taraxaci comp.....	ʒii	60,0

M. S.: A teaspoonful twice a day after eating.

Opium and *chloral* may be indicated to control nervousness, and stimulants, such as *alcohol* and *strychnin,* may be necessary. In the *comatose form* enteroclysis and cooling sponge baths and douches are to be used.

Inhalations of hydrofluoric acid have been used in chronic malarial disease and in cases in which a patient did not tolerate quinin at all, by Olivieri, an Italian physician (*Nouveaux remedes,* October 8, 1902). *Methylene blue,* in ½ to 4 grain doses three times daily, has been successfully given in cases in which there was an idiosyncrasy to quinin. The administration of this drug is often followed by strangury, nausea, vomiting, and headache. Powdered nutmeg lessens the tendency to strangury. The urine turns of an indigo blue. It may be valuable in *hematuric* and *hemoglobinuric* fevers. Tincture of iodin, given internally in one to two drop doses, is recommended in cases of quinin idiosyncrasy. In protracted convalescence a change of air from seashore to mountain, baths, general massage, and active exercise are called for. In malignant types stimulation by strychnin, camphor, alcohol, etc., may be necessary as in any type of acute collapse.

Lately we have had very favorable reports from the use of salvarsan in malaria. E. U. Reed of the U. S. Navy reports a case where repeated relapses occurred under the most rigorous quinin treatment as cured by one dose 0,6 (gr. x) of salvarsan without any other further treatment. This case has been under observation now over a year and a half without the development of symptoms.

Malaria in Children

In older children this disease runs about the same course as in adults. In younger children we observe, first, the *acute form,* in which the onset is occasionally ushered in with chills or convulsions with coma (the cerebral type); second, the *chronic form,* in which the children are anemic and frequently suffer from stomatitis with swollen lymph nodes and an enlarged spleen; and, third, the *masked,* or *irregular, type.* When an intermittency of fever is observed, it is usually of the quotidian or tertian type. Chills do not set in so abruptly as in adults, and the spleen is not regularly enlarged.

Clinical Types of Malaria in Children

1. The *cerebral type,* of acute and subacute onset with high temperature, convulsions, and coma.

2. Malarial infection with *bronchopneumonia.*
3. Malarial infection with *acute enteritis.*
4. Malarial infection with *torticollis.*
5. Malarial infection with *acute* and *chronic nephritis.*
6. Malarial infection with a gradually developing *endocarditis.*
7. *Masked malaria* (*malaise, neuralgia, stomatitis* with enlarged lymph nodes).

The masked types particularly are of daily occurrence in the practice of medicine in malarious districts.

Diagnosis.—The diagnosis is established by means of a blood examination and also by means of the therapeutic test, i. e., the administration of quinin sulphate or euquinin in 3 to 5 gr. doses.

Treatment.—Quinin is a specific for malarial fever. Children take it in 2, 3, or 5 grain doses twice or three times a day. In order to disguise the bitter taste to some extent, it is best given in suspension in compound elixir of taraxacum or in honey. Fluid extract of licorice or elixir of yerba santa will also hide the bitter taste of quinin salts. After the medicine is swallowed, older children may take a lemon candy into the mouth to still further hide the taste of the specific drug.

Euquinin is a quinin preparation adapted for children. It is given in the same dose as the sulphate of quinin.

Malta Fever

Etiology and Clinical Features.—Malta fever is probably the most common name of a disease produced by infection with the Micrococcus melitensis. The organisms are found in the blood but especially in the spleen, where they exist in very large numbers.

The disease is peculiar in that it consists of a series of pyrexial periods lasting one to three weeks, separated by short intervals of normal temperature. The whole disease may cover months or even several years, and while the direct mortality is low, secondary diseases due to the run-down condition of the sufferer may prove fatal. During the attacks headache, nausea, gastro-intestinal disturbance, neurotic and rheumatic symptoms and general prostration are the main features. The disease does not appear to be directly contagious. Lately the *goat* has been accused of harboring the germ in its milk even when not sick itself.

Prophylaxis.—Milk from goats should be boiled. Infected goats should be killed.

Treatment.—The treatment is symptomatic, as in typhoid fever. Some cases treated by a specific serum have been reported on favorably by Wright and Semple. The blood of patients gives a specific agglutinin reaction in most cases after the fourth day. The stronger the reaction the better the prognosis. No other specific medication is known.

Measles

General Considerations.—Measles is probably the most frequent of the eruptive fevers. Practically everybody is liable to this infection. One attack usually gives immunity, but as many as three in the same individual have been recorded. Children under a year quite frequently escape the disease, but when it occurs at this age it is especially severe. A particularly virulent type of the infection occurs in barracks and hospitals where the mortality may run high. The eruption in these cases is frequently not typical but consists of a disseminated petechial rash.

Outside of these rather rare malignant forms the disease itself is not commonly fatal, but owing to the fact that it creates a marked susceptibility to secondary infections, the mortality is much higher than would be suspected. A. C. Tait, in an analysis of 437 cases, gives some interesting figures. He found a general mortality of 5.03 per cent and severe pulmonary complications in 23.37 per cent. Most cases occurred in the fourth year of life and 10 per cent of all cases showed marked diarrheal complications.

The organism producing the disease has as yet not been identified.

Symptoms.—The period of incubation varies from seven to eighteen days, but most cases commence to have symptoms about the twelfth day. As the disease starts primarily as a catarrhal condition of the upper respiratory tract, its incidence is often not particularly noted. To the symptoms of an ordinary "cold" the first characteristic features are frequently a spotted erythema or a hyperemia of the buccal mucous membranes, exclusive of the tongue and sometimes a number of papules with a bluish white head and inflamed base situated on the buccal mucous membrane on a line parallel with the bite of the teeth. These are frequently called Koplik spots and are considered to be pathognomonic when present.

Another peculiarity of measle infection, according to the experience of the writer,[1] is that the temperature curve in the pre-eruptive stage may show a remission to normal or subnormal at irregular periods on the febrile days preceding the eruption. In dealing with measles, the knowledge of these points is important as regards the early recognition of the disease and early isolation of the patient.

Usually on the fourth, occasionally as late as the sixth day, a macular rash appears and spreads over the body. The macules may be discrete or conglomerate but have a tendency to create circinate patterns. The eruption usually starts at the head and spreads toward the feet, develops posteriorly and passes anteriorly and shows first somewhere near the hair line. The development of the rash occurs by the production of successive crops

[1] Caillé, *Trans. Am. Ped. Soc.*, June, 1898.

of macules which occupy the new area and not by a simple widening of its borders. The symptoms of a general nature do not abate with the appearance of the rash but continue for three or four days, when they subside with the decrease of the fever. The rash fades away in the order of its appearance and a fine desquamation follows, which occupies from two to three weeks. A peculiarity of the rash is that it frequently does not involve the palms and soles.

Complications and Sequelae.—Frequent complications and sequelae are bronchitis, enteritis, pneumonia, otitis media, conjunctivitis and pulmonary tuberculosis.

Prophylaxis.—One attack usually confers immunity. Infection may take place in the pre-eruptive stage, and is therefore difficult to prevent. In school epidemics, healthy children should be kept out of school. A case of measles in the home should be isolated.

Dr. M. D. McNeal of the Mayo Foundation recommends the use of a serum from patients convalescing from measles as a prophylaxis in this condition. The dose is 5 c.c. injected intramuscularly. (*See also* Summary of Prophylaxis.)

Treatment.—The hygienic and preliminary management as regards the sickroom, ventilation, bowel action, diet, etc., is the same as in other febrile conditions—cooling drinks and the nasopharyngeal toilet.

A warm bath may be given daily and the eyes may be cleansed externally with warm boric acid solution. In extreme restlessness a single dose of phenacetin may be given at night. A few drops of dilute muriatic acid given three times a day will aid digestion. Older children should gargle with a mild antiseptic solution several times a day.

When a cough is very annoying from five to fifteen drops of paregoric may be given occasionally. If the cough is croupy steam inhalations are indicated.

If there is the slightest indication of a membrane in the throat or nose or progressive hoarseness when actual stenosis is in evidence, a few doses of diphtheria antitoxin are to be given (*see* Croup). A nasal discharge persisting after the eruption has disappeared should be examined for diphtheria bacilli.

When the eruption has disappeared and complications have not developed, the patient may leave the bed. In mild weather the patient may be out of doors after eight or ten days.

Majoli [1] removed by venesection 250 cubic centimeters of blood from the convalescent patient in whom a negative Wassermann reaction had already been demonstrated. The serum was kept at low temperature for 24 hours and then transferred to sterile vials of 5 to 10 cubic centimeters capacity. In the treatment there were used according to the severity of the case daily injections of 5 to 20 cubic centimeters. The mixed serum

[1] Majoli, *Il Policlinico*, Sept., 1915.

obtained from several convalescents produced apparently better results than the serum obtained from one individual. The good effects attributed to this method of treatment are the lowering of the temperature throughout the entire course of the disease, the shortening of this course, and the absence of complications.

Miliary Fever

Miliary fever is unknown in this country. It appears in epidemics—of which there are nearly two hundred on record—and lasts only a short time, usually two or three weeks. It is very contagious—whole communities becoming infected. The period of incubation is very short, usually being less than a day. On the whole the disease seems to be dying out, the last epidemic recorded occurring in France. The mortality ranges between twelve and thirty-three per cent.

Clinical Course.—The disease starts with fever, general indisposition, pains in the muscles and various subjective sensations of oppression, dyspnea or epigastric pressure. The especial characteristics of the disease are profuse sweating and an eruption of papules which later becomes vesicular. There is also a secondary rash which may be a simple erythema, morbilliform or puerperal; the latter appears in the fatal cases and is a bad prognostic omen. In the severe cases violent delirium, followed by collapse, is frequently the order of events. Constipation of a very obstinate type is also associated with the disease.

Treatment.—The treatment is entirely symptomatic. Light cases occur which hardly produce any discomfort, and from this all grades up to those fatal in a few hours. Morphin is said to be well borne and is advised to remove the subjective discomfort. Otherwise the treatment is that of sepsis in general—namely, conservation of the patient's inherent vitality.

Mumps

General Considerations.—Mumps, or epidemic parotitis, is an infectious and contagious disease affecting chiefly the parotid glands, although the other salivary glands may become involved and, by metastasis, the testicles, ovaries, mammae, meninges and nerves of special sense. The bacterial cause has not been definitely settled as yet. Merelli, of the Medical School of Pisa, examined eight cases bacteriologically and isolated organisms—which he called the Micrococcus tragenus—from the blood and also from the serous fluid in the tunica when orchitis was present. The organism differs from some others previously described by not staining with Gram or liquefying gelatin. Neither does it coagulate milk. Inoculation experiments on animals were negative but agglutination tests were

positive in dilutions even as low as 1 to 500, while tests in which serum from healthy individuals was used were negative.

Clinical Course.—The disease has an incubation period of two or three weeks. The onset is marked by fever, chills, vomiting and the other general manifestations of systemic invasion. In a day or two the parotid gland, usually first on one then on both sides, commences to swell, grows tender and the skin becomes shiny and reddened. Resolution without suppuration follows within a week. Frequently as the parotid swelling commences to subside the testicles, ovaries or mammae become involved. It is to be noted that sexual glands are usually not involved at an age before they are functionally active. Sterility may be the result of said involvement. Occasionally the heart becomes involved and causes death. The meninges may also be rarely affected, when violent delirium and death may result, or if recovery takes place, deafness, blindness or various nerve involvements sometimes follow.

Males are more often attacked than females and are most susceptible to the disease during the period between five and twenty years af age.

The cause of the spread of epidemics is not known, but it has been noted to follow pretty constantly epidemics of sore throat. One attack usually gives immunity for life. The disease is especially serious when spread in schools and barracks when as high as ninety per cent of the inmates have been incapacitated at once.

Prophylaxis.—Isolation should be practiced as thoroughly as possible. The contagiousness of the disease exhibits itself at least for five days before the onset and for two to three weeks after the swelling of the glands. As the infection probably gains entrance through the mouth, oral and nasal antiseptic measures are indicated.

Treatment.—The treatment is mild catharsis and a light diet with hydrochloric acid to aid digestion.

Locally heat is usually grateful, and ichthyol or camphor and menthol ointments may be applied.

If the mouth and throat become dry, rinsing and gargling with rose-water and glycerin may be practiced several times a day. If the swollen glands are very painful, bromural, chloral hydrate, or codein may be administered internally.

Complicating conditions must be attended to as they develop.

Rötheln

(*German Measles—Rubella*)

Symptoms.—Rötheln is a mild contagious affection, the main feature of which is a rash. This eruption is maculopapular, of pin-head to split-pea size, of pale rose color, multiform, usually discrete, sometimes grouped

as in measles, sometimes confluent as in scarlatina. Other points about the rash are that it appears during the onset of fever or else at the time of the first symptoms noted, spreads over the body from the face, may be associated with a similar eruption on the fauces at the outset, usually does not cover the body uniformly or completely, is most marked on the upper half and has a tendency to persist longer than measles or scarlatina.

Associated symptoms are slight fever and malaise, enlargement of the postcervical glands, mild conjunctivitis and catarrh of the upper respiratory passages, and rarely albuminuria.

Cause.—The cause of the disease is not known but has been studied with interest of late in connection with filterable viruses which bring up the question of the existence of ultramicroscopic organisms.

Prophylaxis.—In hospitals isolation should be maintained for two weeks. In private practice isolation is hardly necessary.

Period of Incubation.—The period of incubation varies from one to three weeks, that of invasion usually being less than a day.

Treatment.—There is practically no mortality and the treatment is simply moderate restriction of diet, rest, mild catharsis and care of the skin should it become irritating. A fine "peel" may occur when the rash subsides and can be removed by application of olive oil and then rubbing with a towel.

Scarlet Fever

Etiology.—Scarlet fever is an acute, contagious, eruptive fever characterized by anginal sore throat, adenitis, and septic symptoms, and is frequently complicated by otorrhea, nephritis, pneumonia, and severe myocardial degeneration. The cause of the disease is still in doubt.

It has been suggested that following a primary infection with some unknown organism, secondary invasion by the commoner pathological bacteria—especially the streptococci, staphylococci and diphtheria bacillus—quickly follows and most of the symptoms are referable to them. This supposition explains to some extent the fact that vaccines made at one place will often give promising results and yet be disappointing when sent to clinicians in other fields, as the prevalent strains of growth in one locality may not coincide with those of another. The disease occurs most frequently in children between the ages of two and ten years and the existence of burns and wounds appears to greatly increase the predisposition to acquire the infection.

The period of incubation in scarlet fever depends upon: the virulence of the contagious material; the receptivity of the individual; the portal of entry of the infectious material. An individual who is immune to infection in the ordinary way may contract the disease by direct inoculation.

The contagiousness of the disease is less extensive than in measles.

Often exposed persons, while not contracting the typical disease, exhibit more or less sore throat or, even without symptoms, seem to be carriers of the disease. This factor introduces the subject of the chronic "carrier" which may be either a person who has been associated with but not contracted the disease, or a recovered patient still carrying the contagium. Many cases supposed to be contracted from infected rooms, etc., are probably caused by association with these "carriers." While the disease is supposed to be disseminated by the "peel" after the rash has subsided there is little real evidence for this, and in all probability pathological excretions from mucous surfaces have a far greater influence. Of course the nasal and oral secretions are the most likely to form the means of transmitting the disease, but there is a possibility that the urine and tears may also occasionally be factors—the first by contaminating water supplies and the second through the means of the handkerchief. Any chronic discharging foci may also harbor the germs. Secondary infection of milk supplies have been known to cause epidemics of the disease.

Clinical Course.—The incubation period varies from a day or two to a week and the onset is sudden with chill, high fever, sore throat, appearance of the strawberry tongue, and malaise. The rash appears at the close of the first or on the second day of the disease. It commences on the neck and chest and spreads over the trunk and then particularly on to the flexor surfaces of the extremities. Both hands and feet are involved. The type of the rash is a firm punctate eruption between which occurs a diffuse erythema. In severe cases it may be hemorrhagic. It lasts usually three or four days and then commences to fade, when a fine peel develops, which later may change to a coarse desquamation of strips of epidermis. General glandular enlargement occurs during the disease and occasionally suppuration follows.

Any of the above mentioned complications may develop to complicate the picture. Atypical cases occur in which some or all of the usual manifestations are lacking.

Dr. J. D. M. Miller sums up an article on *atypical scarlet fever* as follows:

1. The differentiation of unusual forms of scarlet fever will remain a stumbling block to the practitioner until we have discovered the cause of the disease and are able to employ similar tests to those that we now apply to diphtheria, typhoid fever, syphilis, etc.

2. Not one of the individual symptoms can be depended upon to establish the diagnosis. The disease may occur without rash, desquamation, fever or strawberry tongue. The whole clinical picture must be carefully considered and the individual symptoms critically studied.

3. The most constant symptom is the angina, and its presence associated with a scarlatinal eruption, however slight, however evanescent and however limited in its distribution, should be regarded as sufficient to establish the diagnosis or at least to demand isolation and close observation.

4. Next to the throat the condition of the tongue is the most reliable symptom, some enlargement of the papillae of the tip and border being usually observable, although this symptom is much more frequently missing than is the angina, and may occur in other conditions.

5. Of all the exanthemata, scarlet fever is the most varied and uncertain in its symptoms; and of all the symptoms the rash presents the greatest vagaries. Hence no rash, especially in a child, is too trivial to be disregarded, whatever the general symptoms may be.

6. Scarlet fever with well-marked rash may occur without desquamation.

7. Rubella scarlatinosa is often diagnosed when scarlet fever presents itself as a pronounced erythema with mild constitutional symptoms. This error is a fruitful source of dissemination of the more serious affection. The diagnosis of rubella should be accepted only upon the strongest evidence.

8. The history of a previous attack of scarlet fever should not prevent us from treating with suspicion apparently anomalous cases of the disease.

9. Differential blood counts have produced nothing of value in the diagnosis of scarlet fever.

10. Surgical scarlet fever, scarlet fever following burns and scarlet fever in the wounded should be treated and regarded as ordinary cases of the disease.

11. Scarlet fever without eruption and other anomalous forms of scarlet fever are fruitful sources of dissemination of the disease.

12. Finally, all doubtful erythemas and all cases in any way resembling scarlet fever should be quarantined until the diagnosis is reasonably established.

The mortality in ordinary sporadic cases ranges between 5 and 10 per cent. During epidemics it may rise to 30 per cent. A very virulent form of the disease is endemic in Russia.

Prophylaxis.—Something of the precautions necessary to prevent the spread of the disease can be gathered from the foregoing. Firstly, effective quarantines of the diseased is necessary, which includes methods of safeguarding against "carriers." Secondly, disinfection of contaminated premises and the protection of water and milk supplies from pollution should be secured. Thirdly, all of the patient's discharges should be disinfected or destroyed.

The question of *prophylactic vaccination* must receive serious consideration after reviewing the work of the Russian physicians in limiting the epidemics by the use of vaccines prepared from the blood of patients dying with the disease.

While nothing can be definitely stated as yet for the treatment of the disease when already manifested by serological methods, certainly the prophylactic vaccination is insuring for itself a sure place in preventive medicine. The dosage is 250 million, 500 million, and 750 million killed bacteria given respectively at intervals of one week. Immunity is established seven days after the last injection and lasts about eighteen months. The effect of the injections is the production of local inflammation, occasionally a scarlatinal rash over the body and general malaise for twenty-four hours.

School precautions and household precautions are enumerated in the Summary of Prophylaxis at the head of this section.

All children exposed to scarlatinal infection should have open wounds (including vaccination wounds) thoroughly protected.

In view of the belief that the infection occurs in the mouth, throat and nose, persons exposed to this disease should use gargles or sprays in the throat and sprays in the nostrils of some mild antiseptic solution three or four times a day.

Differential Diagnosis.—In the absence of a bacteriological test, it may be difficult and often impossible (except by those who can see the grass grow) to distinguish a scarlet fever rash from a scarlatiniform rash, such as we occasionally observe after the administration of certain drugs: belladonna, quinin, antipyrin, iodoform, balsam of copaiba, etc., and also in cases of intestinal indigestion. Slight desquamation may even take place in a skin which has been the seat of a scarlatiniform rash, and desquamation following measles is nothing rare.

The measles rash is of a brown red color, and presents itself in large irregular spots. The patient has coryza, cough, sneezing, and dull eyes. In German measles the throat symptoms are absent.

Diphtheria with a scarlatiniform eruption cannot be distinguished clinically from a scarlet fever infection with diphtheritic sore throat; and as regards the drug and indigestion rashes, each case must be judged upon its merits. With a clear throat and normal temperature, it would seem unnecessary to quarantine a patient who happens to have a suspicious rash.

Prognosis is uncertain. The mortality varies from 5 to 30 per cent. We have no means of gauging the power of resistance of the individual as regards sepsis, and, even when the acute stage is safely passed, subsequent complications may endanger and destroy life. Severe throat symptoms, early delirium, uncontrollable vomiting, high temperature, and high pulse are unfavorable symptoms. This is a brief pen picture of a moderately severe case of scarlet fever terminating favorably in due time. Apart from this form, we observe every variety as regards severity, complications, and sequelae.

The *mild form* may present itself with the rash, a red throat, and a temperature of from 100° to 101°, or the rash without throat symptoms and without fever. In this form the pulse is from 100 to 120.

The *severe form* may present an initial diphtheria which spreads over the nasopharynx, with extensive pseudomembranous inflammation and much glandular swelling, invasion of the middle ear, and evidence of scarlatina on the second day.

Initial throat symptoms with a yellowish greenish deposit on the tonsils and throat, a scarlet rash on the second day coming out sparingly, a pultaceous condition of the throat, vomiting incessant, temperature high, pulse 150 to 180, active delirium, and death on the third, fourth, or fifth day. Malignant form.

The *ordinary onset* with diphtheritic complications at the end of the first or second week. Heart, lungs, and kidneys free.

Hemorrhagic Form.—A black eruption, petechial or in large ecchymoses, with hematuria and other evidence of intense sepsis usually fatal from the second to the third day. Some patients recover.

Fatal Septic Form.—Onset sudden and intense, temperature 106° to 107°, delirium, vomiting, convulsions, coma, and death before the rash has had time to develop.

Scarlatina and measles may coexist in the same person.

Treatment.—In very mild cases the children are to be put to bed on fever diet, and they require no other treatment. As soon as a child is known to be ill (with vomiting, fever, and sore throat), it should receive a warm bath, of 100°, and an enema, and be put to bed and isolated in a room the temperature of which is not over 65° to 68°. Should an inspection of the throat reveal a patch of pseudomembrane or a puslike exudate, 2,000 diphtheria antitoxin units should be injected at once and a swab culture taken. If diphtheria bacilli are reported found, the antitoxin injection should be repeated on the following day, and as often thereafter as may be necessary to check a complicating diphtheria. Diphtheria sepsis is not so readily checked by antitoxin in scarlet fever cases as in the uncomplicated variety, but in the experience of the author it does no harm. The antitoxin may be administered daily or every other day, according to the indications, in precisely the same manner as in primary diphtheria without scarlatina.

So long as there is much vomiting, ice to suck and cold and hot drinks are indicated. A fever diet is indicated. A *strict milk* diet is not of special import, but as milk is a perfect food in itself, it may be given to a patient exclusively if he will take it and tolerate it. Water should be given in considerable quantities to assist in elimination. When the vomiting has stopped, a good dose of calomel should be given, followed by a saline, to clear the bowels.

A complicating diphtheria requires the nasopharyngeal toilet in addition to the antitoxin; and a cold compress may be put around the neck. Gargling with antiseptic solutions used in nasal irrigation are indicated for older children.

Stimulation is indicated at any stage of the disease if the pulse is weak.

Sera and Vaccines.—The production of specific sera and vaccines has been taken up in this country as well as abroad. Shultze reports on a series of 128 cases treated by a vaccine made from the cocci found in scarlatinal throats, which seemed to influence the disease favorably and cause a fall of temperature by crisis. Moser has worked over the active treatment of the disease with a serum prepared from a horse and reports beneficial effects. The use of blood serum of immunes is recommended by W. F.

Barker [1] of St. Louis. He reports upon four severe cases with three recoveries. The blood was taken from immunes a long time after they had had the disease. German clinicians have used intramuscular injections of blood taken from scarlet convalescents with good results.

A. Zingher [2] of New York reports beneficial effects observed at the Willard Parker in the treatment of severe forms of scarlatina by this method.

The method of obtaining the blood, and its injection, is very simple: with a 1 ounce (30 c.c.) record syringe, a Lüer syringe or, in an emergency, an easy-working large syringe, and a medium-sized needle (preferably a No. 17 or No. 18 gage platinum iridium needle) the necessary quantity of blood is rapidly aspirated from the vein of the donor which is found at the bend of the elbow, and immediately citrated by adding the blood to a 10 per cent solution of sodium citrate in the proportion of 1 ounce of blood to each cubic centimeter of the citrate solution. This makes the final dilution of the citrate 0.33 per cent. The needle inserted into the vein of the donor should not be removed; the syringe is detached when full, while an assistant carefully fixes the hub of the needle and attaches a 5 c.c. record syringe containing some 1 per cent sodium citrate solution to keep the needle free of blood. Three or four syringefuls of blood may thus be obtained, before it is necessary to rinse out the larger syringe with a 1 per cent solution of citrate which is kept ready in a beaker. We prefer to collect the blood in 100 c.c. bottles, each of which contains 2 c.c. of the 10 per cent citrate solution. To each bottle 2 ounces of blood are added, the bottle being shaken after each addition to distribute the sodium citrate solution. In less than ten minutes, the required amount of blood (from 4 to 10 ounces) is obtained and is then ready for injection into the patient.

The blood obtained in this way is injected into the following regions: triceps, outer regions of both thighs, the calves and both gluteal regions. In young children, half an ounce; in older children and adults, 1 ounce is injected into each of these muscles.

The blood serum is rapidly absorbed, as shown by the soft and supple condition of the muscles on the following day, when they will be found to have regained their former size and consistence. Subcutaneous injections of blood are not taken care of so readily as intramuscular injections and lead to extensive discoloration of the skin. We have noted once or twice a painful swelling of some of the injected muscles, which appeared at the end of ten days. This swelling rapidly subsided without any local treatment.

Twenty-three patients were treated at the Willard Parker Hospital with intramuscular injections of blood. They represent the cases with the poorest prognosis selected out of a total of some nine hundred admissions. Fifteen were treated with convalescent blood, which was citrated in a majority of cases. Nine received pooled blood from two or more donors. The amount injected varied from 2½ to 8 ounces. Of the 15 patients, 4 died; of these (*a*) one died from septic bronchopneumonia two days after the injection; (*b*) one died of a streptococcus sepsis nine days after the injection; (*c*) one was moribund when injected intravenously; he seemed to rally slightly, but the treatment was evidently given at a time when the patient's nervous system was entirely overwhelmed by the toxemia; (*d*) the fourth patient, practically moribund at time

[1] Barker, *St. Louis Med. Soc.*, May 9, 1914.

[2] Zingher, *Jour. A. M. A.*, Sept. 4, 1915.

of injection, had severe meningismus with a marked retraction of the head; he died thirty-six hours after injection. Of the eleven patients who recovered, only five were of the purely toxic type; the remaining six patients had additional severe septic complications, especially tonsillar and faucial exudates, and inflamed cervical glands. The five purely toxic cases showed a critical drop in temperature which varied from 3° to 6° F., after which the temperature remained normal or slightly above normal. In the remaining six cases the drop in temperature was less marked and was followed by a secondary rise which persisted for a number of days. These secondary temperatures were evidently due to the septic complications.

Eight patients received fresh normal blood: of this group none died. These cases were far advanced septic cases, several with a poor prognosis. The blood, which was readily obtained from one or both of the parents, was citrated in six. One of the patients received two injections of 6 ounces each; another three injections, each 8 ounces, at intervals of four or five days. As was to be expected, no striking critical drop but a distinct lowering of the temperature curve was noted, associated with an improvement in the septic complications and the general condition of the patient. The good results in some of these cases are the best proof of the beneficial effect that can be derived from this treatment.

Symptomatic Treatment.—Use of the ice cap, baths, one or two doses of phenacetin, or citrophen—gr. ii to v—or bromural—gr. v.

Otitis media with perforation of the drumhead is a frequent complication. Occasionally complete deafness persists for a time, but eventually the hearing is reëstablished in most cases. If the drumhead is red and bulging perforations may be necessary. A discharging ear is best managed by gentle irrigations with 2 per cent boric acid solution every three hours. To allay pain, a lukewarm boric acid solution holding two grains of cocain to the ounce may be dropped into the ear from a spoon. Inflation of the ear by means of the Politzer bag or catheter should not be practiced, on account of the danger of forcing septic material from the nasopharynx into the middle ear.

Croup and stenosis of the larynx are managed according to the rules laid down in the article on Croup.

Bronchitis may call for the administration of an expectorant, such as the aromatic spirit of ammonia.

Painful and swollen joints are no unusual manifestations in scarlet fever and call for the administration of sodium salicylate and frequent cold compresses with the limb in a comfortable position. *Torticollis* following scarlet fever is occasionally observed. Swollen lymph nodes can be felt underneath the muscles of the neck in such cases. Mild massage is the proper treatment. If *vomiting* persists, a drop of tincture of iodin in a teaspoonful of sweetened water or peppermint water may be given every two or three hours.

Severe Symptoms, Complications, and Sequelae.—*Hyperpyrexia* is best treated by warm baths and in addition a single dose of an antipyretic, according to the rule laid down in the article on Pneumonia.

In severe sepsis (rapid heart, delirium, high temperature) the patient may be kept in the warm bath for an hour at a time. The bath tub must be covered with a blanket in such a manner that only the head of the patient is exposed, and the bath room must be warm (75° to 80°). Stimulants may be given to the patient when he is in the water. After the vomiting is checked and the tongue remains coated, it is wise to give a few drops of dilute hydrochloric acid in sugar water three times a day, to aid digestion. Regarding the management of *meningitis* as a complication of scarlatina, the reader is referred to the article on Meningitis.

Local Treatment of the Nose and Throat.—In the mild as well as in the severe anginas the nasopharyngeal toilet is indicated. Swabbing or cauterization is not indicated. In the diphtheritic variety, in which antitoxin is indicated, as already mentioned, it often happens that the swelling in the nasopharynx is so intense that swallowing is difficult, and a foul discharge and odor are noticeable from the nostrils. Such cases should have regular energetic irrigation of the nostrils in accordance with the rule in the article on Nasopharnygeal Diphtheria.

When external Sloughing is observed, a moist dressing of camphor water or balsam of Peru is probably the best. An extension of the diphtheritic process into the larynx, with stenosis, requires intubation.

Itching of the skin may be allayed by sponging with 1 per cent carbolic acid water, or soda in water, or the free use of starch powder.

Prolonged fever lasting for several weeks which cannot be localized is occasionally observed in otherwise uncomplicated scarlatina. It may be due to infection and swelling of deep seated glands and to other causes, and requires no special medication. Opening the bowels, warm baths, the breathing of good, cool air, and good feeding, with hydrochloric acid to aid digestion, constitute the proper treatment in such cases.

Nephritis and dropsy in the wake of scarlatina are nothing unusual. The urine may contain blood or albumin, and all sorts of casts. In this condition children may subsist on milk if they will take it. Warm tub baths should be given twice a day and an enema after each bath. Small doses of urotropin are also indicated in this class of cases.

In collapse, digitalis, camphor, caffein, whisky, enteroclysis, are the stimulants to be relied upon.

The quarantine should not be raised until the "peel" is cast off and the nose and throat are free and all discharges of a pathological nature have ceased.

Tetanus

Etiology.—Tetanus is produced by a Gram-positive bacillus. The organism leads an aerobic, saprophytic existence in the soil of certain localities and infects the fodder of herbivorous animals.

The ordinary commercial gelatin appears to be frequently infected. Levi and Brun of Strassburg report a contamination of four out of six specimens picked up haphazard in the open market. This factor must receive especial attention when gelatin is used surgically.

While there is little evidence to show that tetanus can gain entrance through the alimentary tract, the possibility of such an occurrence is given. The spores are long lived and very resistant, so that they may become active after long periods of time and may be carried to widely separated localities.

Infection takes place through wounds.

A certain amount of lowered local resistance seems also necessary, as most cases arise from dirty wounds and very few from perfectly clean wounds. Experimentally it has frequently followed that animals infected through wounds made in a surgical manner do not contract the disease, whereas in control animals in which the wound was soiled the disease promptly manifested itself. The infecting organisms do not pervade the entire system of the host but colonize at the point of inoculation.

Clinical Course.—The period of incubation varies from one to twenty days as a rule, but the germs can remain quiescent in the tissues for a considerable time, as cases are on record in which the disease manifested itself several months after a wound had healed.

Two days is about the earliest period for symptoms to develop after infection. Clinically the disease manifests itself first, in a human subject, by a stiffness in the muscles controlling the neck, jaw and tongue. Soon this develops into tonic spasms of some duration—and gradually there is an involvement of all the muscles of the body. The result is to so impede respiration and deglutition that death may follow from either asphyxia, thirst or starvation. Should the case be more protracted a condition of extreme exhaustion may be the determining fatal factor. The spasms are induced reflexly by the slightest irritation of any description.

The fever is rarely very high and the mind remains lucid except when the spasm induces marked asphyxial symptoms.

The spasms are associated with agonizing pain. Death may take place on the third day.

In *tetanus neonatorum* the infection follows imperfect treatment of the navel.

Prophylaxis.—The prophylactic treatment consists in the surgical care of all wounds, and the opening up of the puncture wounds especially, and swabbing them with hydrogen peroxid.

Tetanus antitoxin given subcutaneously in all cases when a development of tetanus is likely, has reduced the incidence of the disease considerably. The prophylactic dose is 10 to 20 c.c.—500 to 1,000 units—given preferably at the location of the suspected wound.

The handling and care of patients and animals sick with the disease,

the disposition of the bodies of those that die and the disposal of the manure of herbivorous animals are all questions appertaining to the better prevention of the spread of the disease. Subcutaneous injections of *chlorinated lime* are advocated as a prophylactic measure in tetanus.

Treatment.—Ashhurst recommends the following procedure in tetanus:

The patient will be placed in a quiet environment with competent nursing facilities. As soon as possible after coming under observation, whether this be in the small hours of the night or at bright noontide the motor nerves leading from the wounded part will be exposed as near the cord as practicable and an intraneural injection of antitoxin will be administered. At the same time an intraspinal injection of at least 3,000 units will also be made according to the usual technic for spinal anesthesia.

Next the wound will be widely opened, all foreign bodies, sloughs, etc., will be removed by forceps, scissors, or scalpel; the wound will be irrigated with peroxid of hydrogen, swabbed out with three per cent of alcoholic solution of iodin, and loosely filled with gauze soaked in the same solution, and an injection of antitoxin will be made (1,500 to 3,000 units) deeply into the muscular tissues around the wound.

Saline enteroclysis by means of the Murphy drip should be given, also effective doses of chloral and bromids may be given by mouth or per rectum, or morphin subcutaneously at appropriate intervals. Feeding will be enforced by the nasal tube passed under chloroform anesthesia if necessary. During the course of the first day 10,000 units of antitoxin should be administered intravenously in addition to that which has been given locally and intraspinously.

Chief reliance is placed on intraneural and intraspinal injections of antitoxin daily, under chloroform anesthesia, until marked decrease in spasticity occurs. Every twelve hours or less often, a moderate amount of antitoxin may be injected intravenously, or even subcutaneously, so as to neutralize the circulating toxins; but the main reliance will be placed on *intraneural* and *intraspinal* injections.

The wound will be dressed daily, as above described, until a healthy granulating surface is obtained.

With such treatment, commenced within twelve hours of the first appearance of symptoms of tetanus, the mortality of the disease should not be over twenty per cent.

Baccelli has recorded marked success by the subcutaneous injection of carbolic acid. A 2 per cent solution is used and from 0,2 to 0,4 gms. of the acid are given in twenty-four hours. In urgent cases this dosage may be doubled. The known effect of carbolic acid in lessening reflex excitability is the indication for the drug. In order to overcome the effect of the prolonged spasms which produce a good many deaths before the antitoxin can become effective many methods have been devised. The simplest is chloroforming the patient.

Meltzer and Auer recommend subcutaneous or intradural injections of a twenty-five per cent solution of magnesium sulphate to relieve the spasms. For subcutaneous injection 1.2 c.c. of a 25 per cent solution may be injected three to four times a day throughout the entire disease, while for

intraspinal injections 1 c.c. for every twenty pounds of body weight is advised. Injections are made every twenty-four hours as long as indicated and in hyperacute cases may be repeated at twelve hour intervals at first. Occasionally the use of magnesium salts is attended by toxic symptoms which, if developed, can be successfully antagonized by physostigmin. Of the drugs which may control the symptoms, chloroform, chloral and the bromids stand out preëminently. Morphin should be used only to control agonizing pain. Magnesium and antitoxin treatment may be given simultaneously.

Tick or Rocky Mountain Spotted Fever

General Considerations.—This is an acute, endemic, non-contagious, but probably infectious, febrile disease, characterized clinically by a continuous moderately high fever, severe arthritic and muscular pains and profuse petechial or purpural eruption in the skin, appearing first on the ankles, wrists, and forehead, but rapidly spreading to all parts of the body. The disease may run a mild or severe course, but this distinction refers rather to a comparison of cases from different localities than of those at any one place, for as a rule the disease in one locality is either benign or severe throughout all the cases that develop. Thus the mortality in the Bitter Root Valley of Montana is high, while in the valley of the Snake River in Idaho the death rate is usually low.

It has been noted also that children stand a better chance of recovery than adults.

One might question the unity of the affection as manifested in these two places except for the fact that agglutinin reactions are interchangeable and an attack of one variety gives immunity to the other. The disease occurs in the spring months—which occasioned the belief that the water from the melting mountain snows carried the contagium; but it has been pretty definitely established by the work of Ricketts and others that the disease is transmitted by the bite of infected ticks and is not water borne. The disease remains peculiarly endemic and has spread little beyond the confines where it was first discovered in the last thirty years.

It has been found that ticks, once infected, carry the virus throughout their existence and from one developmental stage to another, as from larvae to nymphs and nymphs to adult ticks. Further, about fifty per cent of infected females transmit the disease to their eggs which nevertheless are capable of development. As the number of ticks in these localities remains approximately constant, if inheritance in the proportion stated were the only means of maintaining the disease, it would decrease by a progressive ratio until it reached a point of elimination. Actually the disease is on the increase, so that a further means of propagation must be looked for.

It has been found that infected ticks will cause the disease to be

transmitted to many of the smaller wild animals. In such creatures the period of incubation is three to five days and the course of those recovering six to twelve days. During the active period of the disease healthy ticks feeding on sick animals become infected. When the animal recovers is acquires an active immunity to the disease and does not carry the virus in its blood. That the disease is not carried by the roving animals is shown by its slow spread. Squirrels, mountain rats, and the like seem to be the most susceptible. Man plays only a casual part in the story—as the disease is found in locations which he does not inhabit and, furthermore, ticks require a long time to fix themselves to the skin and even a longer time to feed, thereby precluding the human sufferer from being a means of transmitting the disease to them, as all patients in districts where the affection exists are most carefully protected from these pests.

Concerning the nature of the virus carried by the tick we know little.

Prophylaxis.—Prophylaxis demands attack upon ticks and the wild animals upon which they feed. Some domestic animals are found also to harbor ticks and should therefore be protected as well as possible. The special hosts for ticks are reported as being: the horse, cow, dog, swine, sheep, elk, deer, mountain goat and sheep, bear, ground squirrel, rock squirrel, ground hog, chipmunk, mountain rat, and rabbit. Of these animals, the ground squirrel, ground hog, rock squirrel, chipmunk and mountain rat were all proved experimentally to be susceptible animals for the infection. Experimentally guinea pigs, rabbits, and monkeys have been used.

While no vaccine can be made until this causal agent is found, it has been suggested to infect prospective visitors to the haunts of the virulent type of disease with virus of the benign form, as this procedure will render the individual immune to the dangerous variety as well.

Treatment.—Use has been made therapeutically of the sera of animals recovering from the disease and promising results reported. The treatment otherwise is purely supportive and symptomatic.

Typhoid Fever

(*Enteric Fever*)

General Considerations.—Typhoid fever is an acute infectious disease due to the invasion of the Bacillus typhosus of Eberth, causing inflammation and ulceration of the lymph follicles of the intestine and swelling of the mesenteric lymph nodes and the spleen.

The chief symptoms presented during an attack are protracted fever, diarrhea, tympanites, wasting, headache, insomnia, delirium, anorexia, prostration, and mental apathy. The disease is self-limited, and death

occurs from asthenia, visceral complications, hemorrhage, or perforation, followed by peritonitis.

The specific germ is not the only pathogenic factor, as it has been proved that in the latter stages of the disease other microörganisms play an important part, not only in determining the extent and character of the bowel lesions, but also in the production of general toxic infection.

Clinically, the disease is marked by fever and wasting, roseola, diarrhea, abdominal tenderness and tympanites, such symptoms being inconstant.

After a rather long incubation period usually occupying some two or three weeks, symptoms of general malaise with ascending temperature set in. The fever usually reaches its height about the fourth day, where it remains with small remissions until the third week. The earliest clinical signs are the diazo-reaction in the urine, a positive blood culture, rose spots and enlarged spleen. Later the Widal reactions appear in the blood. About the third week, and sometimes during the fourth week, the fever starts to remit and reaches normal. Sometimes these periods are considerably lengthened or else cut short.

The pulse is slow in comparison to the fever and towards the end becomes soft and dicrotic.

The remote effects are inflammatory and degenerative changes in various organs and tissues. Enteric fever is common in early and middle life; it has a period of incubation of from eight to twenty-three days, during which time there is a feeling of weakness and lassitude. Family predisposition has been noticed; a second infection is rare. In the early stage of enteric fever the bacilli are found in the lymphoid tissue of the intestines, and afterward in the spleen, liver, kidneys, bone marrow, bile, and urine.

Prophylaxis.—*See* Summary of Prophylaxis and Methods of Disinfection.

Human dejecta are at the bottom of all epidemics, either as a direct source of contamination or through a second carrying agency, such as flies. The problem, therefore, resolves itself into the proper handling and disposal of this material.

Modes of Infection—Etiology.—Enteric fever and Asiatic cholera are caused by swallowing food and drink contaminated by the discharges of previous cases. Milk contaminated with enteric fever water may carry the infection, also raw oysters taken from contaminated water. The Bacillus typhosus is not destroyed by freezing, and may be conveyed by means of ice. Uncooked vegetables may carry the infection, and in all probability the common house fly is occasionally the vehicle of its transmission.

Personal Prophylaxis.—*Prevention of the Spread of Enteric Fever.*—In order to reduce the danger of infection to a minimum we must secure

pure water and good drainage; isolation of the sick; and disinfection of urine, feces, and their receptacles, soiled linen, soiled hands of the nurse or attendant, and soiled thermometers.

Drinking water is the chief source of infection. One single case may prove the starting point of an epidemic. Enteric fever germs live a long time in water and soil. The influence of abolition of urban wells and the introduction of sand filtration of drinking water on the mortality from enteric fever is graphically shown by Dr. Seibert's charts.[1]

On passing to the influence of sand filtration of drinking water on typhoid mortality, we again find in the experience of Berlin the most conspicuous example, for instead of one typhoid death in every 900 inhabitants annually from 1843 to 1853, this city lost but one person out of every 9,000 of typhoid annually from 1883 to 1893, although not all of the city's wells had been closed and the supply of filtered water from the old waterworks (installed in 1853) had become insufficient on account of the rapid growth of the city. But when, about 1892, the new waterworks which could supply 2,500,000 inhabitants with pure, filtered water, were completed, this mortality was promptly reduced to one in 50,000, although the population of Berlin had increased from 400,000 in 1853 to 2,000,000 in 1890.

If the typhoid germ is transmitted to persons in close connection with the patient, only *isolated* cases occur (infection by contact). The preparation, storage, and sale of provisions in or near rooms occupied by typhoid patients should not be allowed, and typhoid patients should be transported in ambulances which can readily be disinfected. If the germs are transmitted to articles in general use, such as milk and water, epidemics may arise.

Typhoid Fever from Rural Districts.—The ordinary farmer, with the "moss covered bucket" and clear well water, is not always to be trusted as an expert sanitarian, nor is he apt to volunteer any information concerning the fever cases that have occurred either in his own house or in that of his neighbor.

An old well is always a menace, and when it becomes poisoned it is next to impossible to make it safe afterward. Even brooks take a long while to cleanse themselves, and the microörganism has been known to exist over eighty days at a time in filter sand.

Defective surface drainage quite naturally prolongs the period of chance infection. This was shown in the epidemic of Munich in 1898, which was said to be due solely to soil pollution. *Contaminated manure* is also a factor, and salads and other garden produce are likely to be the vehicles for the conveyance of the germ directly to the consumer.

Under all circumstances a rigid and frequent inspection of dairies and the households of dairymen is a necessity, and wells which have been contaminated by enteric fever discharges should be closed up. As regards *personal prophylaxis,* it may be stated that the individual can best protect

[1] Seibert, *New York Med. Jour.,* Nov. 29, 1902.

himself in an infected district by drinking water and milk which have been boiled and by remembering that *raw oysters* may carry the infection and that *air-borne* contagion is a possibility, inasmuch as germs may be diffused in the dust of dried excreta and light on milk, meat, and vegetables, and that it may be carried by flies which have found access to the excrement of typhoid fever patients. Persons traveling by railroad or boat should not drink unboiled water or milk unless they are sure of its purity.

The importance of the disinfection of the urine, feces, sputum, and bed linen cannot be overestimated, for it strikes at the root of the evil. Persons afflicted with typhoid fever should never use closets. All excretions (from bowels, bladder, or stomach) should be retained in easily cleansed vessels and never thrown into closets or manure heaps before being disinfected. They should be rendered innocuous by means of lime milk or chlorinated lime or diluted carbolic acid before being removed. In cases of emergency, if no disinfectants are at hand, the excrements can be buried in places far removed from drains, pumps, and buildings, where infection is not to be feared. Special care must be taken not to carelessly throw excrements away or soil the floor, clothes, etc., not even with traces of the excrements.

Special attention must be given to the sputum of patients in order to render it innocuous. Handkerchiefs and cloths which were used must be placed for at least one hour in diluted cresol or boiled in water, before being sent to the laundry.

For catching the sputum and wiping the mouth and nose, it is best to use gauze cotton rags, which must be disinfected after use or burned.

The evacuations and urine of typhoid patients should never be thrown near pumps or drains, where water for drinking and other purposes is taken; the vessels after being emptied should never be cleansed at places from which water is supplied or taken. Water used for washing and bathing typhoid patients can also cause infection. It must therefore be rendered innocuous and must not be poured away near drains and pumps. If possible, it should be made innocuous by an addition of chlorinated lime before removal, in order to prevent all infection.

Attention must be paid to the fact that the evacuations of persons who have had typhoid fever, and who are already convalescent, yet contain infectious germs for a long period. Such persons must be treated as if they were still ill, as far as disinfection is concerned, until the physician declares that infection is no longer to be feared.

Treatment of Body and Bed Linen, Clothes, and Other Articles of Use.—All washable clothing, such as body and bed linen and washable parts of clothing, should remain at least one hour in diluted solution of cresol or boiled in water before being sent to the laundry. Articles of clothing used by typhoid patients, which cannot be washed, should be

disinfected with steam in a disinfecting establishment if possible. Also all eating utensils (plates, cups, glasses, spoons, forks, knives, etc.) used by typhoid patients should be thoroughly cleansed with hot soda solution before being used by other persons.

How long does typhoid fever remain infectious? Typhoid carriers remain infectious throughout the carrier's life. Ordinarily convalescents should be controlled at least six weeks after defervescence.

New York Health Board Rules for Typhoid Carriers

1. *You must not have anything to do with food or drink to be used by others,* either in your business or at home. Don't go to the ice box or refrigerator. Don't hand anything at the table. Have your own plates, cups, glasses, spoons, forks, etc., separate from the others, and washed and kept for you alone. If you happen to leave any food or drink it must be thrown out and not be used by others.

2. *Every movement from your bowels not passed into a toilet flushed with water and connected with a sewer, must be disinfected with some good disinfectant,* such as chlorid of lime or cresol, letting it stand for some minutes. Keep a supply of the disinfectant on hand for this purpose. When a toilet with running water is used, thoroughly clean the bowl daily.

3. After using the toilet *wash your hands* with plenty of soap and water. Do this every time. Dry your hands well. Do not let other people use your towel.

4. Do not have a movement of your bowels except at a regular toilet. Try not to use the toilet when away from home during the day. If you have only an out-door privy to use, keep it disinfected all the time with quick lime, and screened from flies.

5. Keep yourself and everything about you very clean. Disinfect your underclothing before sending it to the laundry.

6. Every person with whom you live *must be immunized* against typhoid fever.

Immunization in Typhoid Fever

L. I. Harris and M. L. Ogan record the results of the experience of the Health Department of New York City in typhoid immunization. This procedure is definitely preventive in all but a relatively insignificant few cases. In those subsequently affected it strikingly decreases the morbidity and the mortality. Severe reactions are rare, and are avoided by the following precautions: Never administer the vaccine to any but the healthy. To permit of slow absorption, avoid puncture of a vein, or intramuscular injection. Clean the syringe and sterilize the area for injection, using tincture of iodin for this purpose. Children especially are to avoid exposure to the sun following the treatment. Avoid administering the vaccine during the menses or pregnancy. Allow no hard

work or indulgence in alcohol after the injection. Avoid reinjecting in indurated areas. Severe reactions have never left permanent injury. When the incubation period has begun, the time for antityphoid immunization has passed. Long exposure to overwhelming doses of typhoid bacilli (in those who are in close contact with cases and especially in epidemics) may nullify the immunizing powers of antityphoid vaccine, and an attack may therefore follow one or more injections. Chronic illness (tuberculosis, etc.), as well as debility from other causes, fatigue, and exhaustion, predisposes to severe reactions.

Injections after intimate and long exposure hasten the onset. For a period of at least two years, and possibly more, immunization is as effective in protecting from an attack of typhoid fever as is a previous attack of the disease itself. Recurrences may follow after a complete immunizing course of treatment, in exceptional instances in which debility and fatigue exhaust the resistant and defensive powers of the body, and when exposure to massive doses of typhoid bacilli exists.

How to Immunize.—The method is to inject over the insertion of the deltoid muscle, at three sittings separately, in intervals of about ten days, an emulsion of the dead typhoid bacilli representing successively five hundred million, one thousand million, and again one thousand million germs. A reaction occurs during a period of about twenty-four hours, during which time there is fever and malaise. The effect of the vaccination lasts about two years.

All young physicians, nurses, orderlies, boys and girls who leave home for seminaries or colleges, or anyone who intends to travel where it is impossible to guarantee that every drop of water used or taken, or that the milk or food may not be contaminated with typhoid bacilli, should receive the preventive inoculations.

The Abortion of Typhoid Fever

Emetin hydrochlorid has been suggested as abortive treatment for typhoid fever. It is injected subcutaneously in half grain doses for adults (smaller doses for children).

The injection should be started early and repeated every six to twelve hours until the afternoon temperature is 100° or 101° F., and then given in half the dose, until the temperature is normal.

This method has not been sufficiently tried out to permit of its recommendation.

The Symptoms of Typhoid Fever

The prodromal symptoms, extending over a week or ten days, are loss of appetite, nausea, vague pains, faint rigors, and diarrhea or constipation. There is a steady rise of temperature, and toward the end of the first week a rash appears on the abdomen, chest, back, or extremities, which is rose-

colored, not elevated, and disappears on pressure (roseola). The spleen may or may not be enlarged.

In the second week the fever becomes higher and the pulse more rapid (110). The mouth, throat, and lips are dry, the tongue has a brown coating, and the face has a dull expression. Ileocecal gurgling, tympanites, diarrhea, and abdominal tenderness are present in pronounced cases, and symptoms of disorder in the nervous and respiratory system are noticeable.

In the third week the temperature is quite high, with a morning remission and a tendency to decline. The abdominal symptoms are pronounced, and hemorrhage or perforation of the bowel is not infrequent.

About the end of the third week or beginning of the fourth week convalescence usually sets in, but severe cases often drag on to the fifth, sixth, and even the twelfth week. The fall of temperature is gradual, the evening temperatures are 1° to 2° higher than the morning temperatures. In rare instances the fever type is inverted, the high temperature being noted in the morning.

The Fever of Convalescence.—After the temperature has been normal for several days there may be a sudden rise to 102° or 103°, with a drop to the normal within a day or two. This is generally due to constipation or indigestion and necessitates a careful clinical inquiry as to possible complications.

The fever of relapse is similar to that of the original attack, though generally but not always milder, and may persist for weeks.

Respiratory symptoms in enteric fever are rapid breathing, bronchial moist râles, and other signs of acute bronchitis.

Circulatory Symptoms.—In the beginning the pulse is usually dicrotic. When the heart sounds become feeble, a soft systolic murmur may be heard over the heart.

Gastric Symptoms.—A coated tongue with red edges and loss of appetite are generally observed. Sordes collect upon the teeth. Nausea and vomiting are not frequent.

Intestinal Symptoms.—Abdominal tenderness, tympanites, and ileocecal gurgling are usually present. Whether diarrhea or constipation is present depends upon the situation of the intestinal lesion. The pea soup stools are characteristic.

Nervous Symptoms.—Headache, mental torpor, muttering or active delirium, subsultus tendinum, stupor, and coma may be present.

Other Symptoms.—*The blood* shows a reduction of the hemoglobin index, a lowering of the number of red corpuscles, and no leukocytosis.

The urine is high colored and often there is retention. Ehrlich's diazo reaction is frequently observed. The urine may contain albumin, tube casts, blood, and great quantities of typhoid bacilli.

The skin may be hot and flushed or moist, pale, and slightly cyanotic

in circulatory failure. Roseola, erythema, and sudamina are generally to be seen.

The eyes are often injected and the pupils are generally dilated. *Hearing* is usually dull.

Diagnosis of Typhoid Fever

The diagnosis is based on the clinical symptoms, the peculiar temperature curve, the presence of rose spots, the positive Widal reaction, the absence of leukocytosis, the positive diazo reaction, and the failure of the blood test and therapeutic test for malarial infection. In a certain number of cases the Widal test remains negative, and all the clinical evidences of enteric fever are present. Such cases are explained on the assumption of a *paratyphoid fever,* due to bacillary infection not of the Eberth bacillus variety.

Differential Diagnosis.—*Diseases Simulated by Enteric Fever.*—A localization of the enteric fever poison in the meninges may simulate *cerebrospinal meningitis;* a localization in the kidneys gives symptoms of *acute nephritis;* a localization in the lungs may simulate *acute lobar pneumonia.* A positive Widal reaction and the presence of other clinical manifestations of enteric fever will set us right. The distinction of malarial remittent and enteric fever rests upon the following points: In *remittent malarial fever* we often find herpes labialis, the pulse is rarely dicrotic, there are no rose spots, and the abdominal symptoms are not marked. In about seven days after the onset of the disease the plasmodia should be abundant in the blood and the administration of quinin will influence the fever, while the Widal reaction will be wanting. A double infection of enteric fever and plasmodium fever is theoretically spoken of as *typho-malarial* fever.

Simple Continued Fever.—A fever of gastric or intestinal origin may last for seven or eight days and simulate enteric fever. The blood and urine reactions, the therapeutic quinin reaction, the clinical symptoms, and the roseola of enteric fever are absent.

The estivo-autumnal variety of malarial fever may simulate enteric fever.

Acute miliary tuberculosis will show an irregular fever and a more rapid respiration and pulse. The therapeutic and blood tests will be negative. The diazo reaction is occasionally observed in tuberculosis. Tubercle bacilli may be found in the sputum.

Tuberculous peritonitis, salpingitis, and catarrhal enteritis may be mistaken for enteric fever. The Widal test should be applied, and a local examination and the absence of clinical symptoms of enteric fever will lead us to a correct diagnosis.

Appendicitis may simulate enteric fever, the latter may simulate appendicitis, and appendicitis may complicate enteric fever. The abrupt

onset, a careful local examination, and the absence of the Widal reaction will establish the correct diagnosis.

In SUBACUTE ULCERATIVE ENDOCARDITIS, which may be mistaken for enteric fever, we observe recurrent chills, an irregular fever type, and endocardial murmurs, whereas rose spots, abdominal symptoms, and the Widal reaction are absent.

INFLUENZA is rarely mistaken for enteric fever. The absence of the Widal reaction and the finding of the influenza bacillus in the sputum will lead to the correct diagnosis.

UREMIA of a subacute or chronic type, with slight rise of temperature, stupor, and a rapid pulse, may be mistaken for enteric fever. In the absence of a rose rash and the Widal reaction, and with positive urinary findings, the distinction should not be difficult.

TRICHINIASIS has been diagnosticated as enteric fever on account of the fever, delirium, abdominal pain, and diarrhea. In trichiniasis the Widal reaction is absent, the eyelids are swollen, the muscles are swollen and painful, and trichinae may be found in excised muscle tissue.

In TYPHUS AND RELAPSING FEVERS the onset is sudden and the defervescence is critical.

The Clinical Varieties of Typhoid Fever

1. THE MILD FORM.—All the symptoms are mild, the temperature does not go above 103°, and the disease does not generally last more than two weeks.

2. THE ORDINARY FORM, without special or severe complication, has been described under Symptoms of Typhoid Fever.

3. THE ABORTIVE FORM lasts about two weeks and terminates with considerable sweating.

4. THE LATENT, OR WALKING, TYPHOID (AMBULATORY TYPHOID).—The symptoms for the first two weeks may be exceedingly mild, and the afflicted person is able to attend to work, but is eventually compelled to go to bed.

5. THE GRAVE, OR SEVERE, FORM.—The fever is high (105°) and may persist for five, six, seven, or eight weeks. Most of the classical symptoms of enteric fever are present and severe.

6. ENTERIC FEVER IN THE AGED shows a lower fever range and more pronounced cardiac, pulmonary, and renal complications.

7. In the SO-CALLED HEMORRHAGIC TYPHOID the purpura and the hemorrhagic diathesis occurring during the course of enteric fever are secondary and associated with septic complications. These cases are not to be confounded with cases of intestinal hemorrhage occurring during the course of enteric fever.

8. Finally, it may be emphasized that persons may have TYPHOID BACILLI IN THEIR STOOLS *without symptoms.*

9. Paratyphoid Fever.—The Widal reaction is absent, while from the blood is obtained a bacillus intermediate in type between the typhoid and the colon bacillus. The paratyphoid bacillus may be defined as a member of the intermediate group which produces typhoidal symptoms in man. The fever is usually mild. The number and frequency of the complications form a striking feature of the disease. The surest way of making the diagnosis is to cultivate the paratyphoid bacillus from the blood of the suspected case. But if the organism cannot be recovered from the blood, urine, feces, or some localized lesion, the diagnosis is justified, in the light of our present knowledge, if the blood agglutinates a paratyphoid bacillus in high dilution and fails to agglutinate the typhoid bacillus or agglutinates it only in very low dilutions. There are two kinds of paratyphoid bacilli, A and B, and the blood should be tested with both, as in some cases a negative reaction will be given with one and a positive reaction with the other.

Prognosis of Typhoid Fever

The disease is self-limited. The mortality varies from 5 to 15 per cent. When death occurs it is usually due to circulatory failure, hemorrhage, perforative peritonitis, or some other complication.

Treatment of Typhoid Fever

The patient must be put to bed and isolated, and all precautions mentioned in the summary on prevention, in this section, must be taken.

Before the diagnosis is certain an adult patient may take one dose of quinin and calomel—10 grains each—to be followed by a saline cathartic. If the bowels are loose this is not advisable.

Daily flushing of the lower bowel with soapsuds or a warm saline solution is indicated as a routine procedure, except in peritonitis.

Specific Treatment.—Vaccine treatment is in its experimental stage and up to the present time has not given satisfactory results.

Treatment by convalescent typhoid serum has been tried in a limited number of cases with apparent good results. This method deserves further study.

Hydrotherapy.—The sponge bath is a convenient procedure in private practice. The patient is sponged on a blanket. Considerable friction is applied, and the temperature of the water may range from 60° to 70° F.

Cold water may be applied by means of a moist compress placed around the chest or over the abdomen. Such applications may be changed every hour or two. When a moist cold compress is placed so as to envelop the body, we speak of a *sheet bath*. Cold water may be poured onto the sheet while friction is applied.

A full bath, or "tub," is best given by placing the patient in water of from 85° to 90° F. and gradually reducing the temperature to 80° and

70° F. while friction is applied. A full bath at 70° is for robust people. Children, the aged, and the weak do not take kindly to a cold bath. By hydrotherapy we attempt to bring on a reaction to equalize the circulation and to promote elimination.

Diet.—The diet must be fluid and supply fuel to prevent tissue waste. It must be readily digestible, leaving but little residue to mechanically injure the diseased bowel, *which is always affected in this disease.*

Specimen Diet.—Milk with lime water or with Vichy water; white of egg in water (whites of two eggs to one pint); egg nog; gruel, oatmeal or barley; burnt flour gruel (in diarrhea); ice cream, water ices, blanc mange, custard; pea soup, rice, beef, chicken, and tomato soups; buttermilk, matzoon, cream and coffee, milk and tea, cocoa, ginger ale, whisky, pineapple and orange juice, cold water in abundance. *See also* Fluid Diet.

When milk disagrees with a patient and whenever the abdomen becomes markedly tympanitic, the use of milk should be discontinued.

Liquid diet should be adhered to until the temperature has been normal for a week, after which soft diet may be allowed.

Food should be offered to the patient in three hour intervals. From 2,000 to 3,000 calories will suffice for twenty-four hours. (*See* Caloric Values in Bedside and Office Technic.)

To aid digestion, 5 drops of *dilute hydrochloric acid,* in water, should be given after each feeding.

Competent nursing will prevent *parched lips, foul tongue, sordes,* and *bedsores.* In uncomplicated cases of typhoid fever *medication is unnecessary.* The so-called intestinal antiseptics are useless or harmful, and antipyretic drugs are of doubtful value.

Treatment of Complications and Sequelae.—Pain and Tympanites.—Discontinue milk; apply hot turpentine stupes to the abdomen; use rectal tube to aid in expelling gas and give a soapsuds enema. Turpentine in emulsion may be given internally:

℞	Spir. terebinth. }	āā ʒi	4,0
	Spir. lavandul co. }		
	Pulv. gum arabic	ʒii	8,0
	Syrup	ʒiv	16,0
	Aquae	ad ʒiv	120,0

M.D.S. One teaspoonful every two hours until the patient is relieved.

Codein may be given to relieve pain.

Diarrhea.—Loose stools are the rule in typhoid fever. In case of an active diarrhea, milk is discontinued, and a "binding diet" (*see* Bedside and Office Technic) administered. The patient may take a teaspoonful of paregoric or bismuth—gr. xv—with opium—¼ gr.

Or,

Tannalbin with opium

Or,

℞ Bismuth subcarb. ..... ʒi 4,0
Extr. Krameriae fl. ..... ʒi 4,0
Syrup ..... ʒiv 16,0
Aquae ..... ʒii 60,0
M.D.S. One tablespoonful several times a day.

Constipation.—Constipation is readily overcome by means of an enema or a saline laxative.

Retention of Urine.—This condition must be relieved several times a day by means of a *clean catheter.*

Nervous Symptoms and Psychoses.—These are best controlled by hydrotherapeutic measures (ice cap and cool pack); also by medication:

Bromural ..... gr. x to xv 0,6 to 1,0
Chloral hydrate..... gr. x to xv 0,6 to 1,0
Morphin ..... gr. ⅛ to ¼ 0,008 to 0,015
Hyoscin ..... gr. 1/100 0,0006
} by hypo.

Bowel Hemorrhage.—Discontinue bowel irrigations; place two ice bags on abdomen and give:

Tannin ..... gr. x 0,6
Or, Opium ..... gr. ½ 0,03
Or, Morphin ..... gr. ⅛ to ¼ 0,008 to 0,015
Or, Acetate of lead..... gr. ii 0,12
Several times a day.

Blood serum or whole blood may be injected subcutaneously for its bloodclotting effect. If the loss of blood is excessive hypodermoclysis or venous infusion of saline may be indicated, also blood transfusion.

Circulatory Failure.—In circulatory failure we adopt timely stimulation by means of whisky, champagne, camphor, digipuratum, strychnin, or enteroclysis at 110° F.

Venous Thrombosis (Peripheral).—Rest and an ice bag. In septic phlebitis pus and ichorous fluid must be evacuated by the knife.

Pericarditis—Parotitis—Mastitis—Orchitis.—Administer laxatives and apply cold or heat.

Periostitis—Bone Necrosis—Pyothorax.—These are treated surgically.

Pneumonia—Hypostasis—Local Gangrene—Bedsores—Typhoid Spine—Perichondritis of the Larynx.—These are among the many

complications observed in typhoid fever—also TEMPORARY OR PERMANENT BALDNESS.

PERFORATION AND PERITONITIS.—This occurs in about two per cent of cases. It is announced by sudden severe pain, collapse, abdominal distention and peritonitis, and is frequently fatal. As soon as perforation is recognized the patient must be stimulated and prepared for an operation, if the circulation is not absolutely bad.

Typhoid Fever in Children

Typhoid fever in children is usually of brief duration.

The temperature, as a rule, is not excessive.

The chief danger is in overloading the digestive tract, and thus producing tympanites, intestinal irritation, etc.

These dangers are to be avoided by discontinuing milk as soon as the abdomen becomes distended and by frequent enemas.

Transporting Typhoid Fever Patients

This should never be done when it can be avoided.

Paratyphoid Fever

Paratyphoid fever is an enteric fever due to other than the Eberth bacilli. Bacteriologically, two forms can be distinguished which have been designated *paratyphoid A* and *paratyphoid B*. In general the disease is milder, and does not last so long as the true typhoid, but there are many exceptions.

Prophylaxis.—In Enteric Prophylaxis it is suggested that instead of the monotyphoid vaccine a mixed vaccine should be employed.

Treatment.—The treatment of paratyphoid is practically identical with that of the true typhoid fever.

Typhus Fever

(*Spotted Fever*)

Etiology.—Typhus fever is an acute, very contagious, eruptive fever. It is a disease closely associated with filth and does not flourish in cleanly surroundings.

Recently Plotz has isolated an anaërobic, Gram-positive bacillus, which he believes to be the etiological factor.

Clinical Course.—The disease develops at varying intervals up to two

weeks after exposure. Its onset is marked by general malaise, headache, pains throughout the body and fever.

The fever is of the sustained type, and in favorable cases ends by crisis on the fourteenth day. On the fifth or sixth day of the disease a macular rash breaks out which becomes petechial. Death occurs from exhaustion, cardiac collapse or pulmonary complications.

The mortality ranges from ten to twenty per cent. Children rarely die from this disease.

Prophylaxis.—Isolation of all cases or suspects must be rigorously maintained and the after-disinfection of their abode most rigorously carried out. Everything that can be burned had best be disposed of in this way.

In large camps of prisoners in the present war the measures were directed to "unlousing" the men, thorough soaping, bathing and shaving while the barracks were being washed out with hot five per cent cresol soap solution, and their clothing and bed sacks were being disinfected with steam, and the straw filling burnt. Before a man was admitted to the hospital he was bathed anew and examined for lice. The hospital quarters were thus kept free from vermin and no contagion occurred in the hospital personnel, but some contact cases developed among the attendants in charge of the unlousing.

Treatment.—The general management of this disease is like that of typhoid fever. Patients do best if they can be treated in the open air.

Variola

(*Smallpox*)

Organism.—Variola, or smallpox, is an acute contagious eruptive fever, the infective agent of which has not yet been discovered.

Clinical Course.—The incubation period varies from one to two weeks or rarely longer. The onset is sudden with rise of temperature, chills, vomiting and severe pain in the back. The specific eruption occurs on the third day as a maculopapular rash on the wrists and forehead; the rest of the body is covered in the course of the next two or three days. By the sixth day the papules have become vesicular and show umbilication. With the appearance of the rash the initial symptoms abate and the fever drops. On the eighth or ninth day the vesicles become pustular, fever and general malaise return and from thence on the disease follows a septic course. In favorable cases the pustules dry up and the scabs are cast off during the two or three weeks. With the drying of the pustules the symptoms subside.

Occasionally the eruption becomes confluent and sometimes hemor-

rhagic; either of these conditions renders the prognosis more grave. Patients with the hemorrhagic type rarely recover. The earlier the hemorrhages appear in the case, the more severe it will be.

After the disease has subsided the skin is seen to be scarred or pitted. The extent to which this occurs can be modified by treatment.

Prophylaxis

Vaccinia is the condition produced by the inoculation of cowpox virus and has the result of adding a high degree of resistance to subsequent infection with smallpox. Since the world-wide use of this method of securing protection against smallpox the disease has been rendered a medical curiosity in civilized countries of the temperate zones, while formerly it killed vast numbers of people in frequently succeeding pandemics. The disease still has a more or less extensive endemic existence in the tropical zone and thus threatens a general revival, should vigilance in the matters of quarantine and protection by vaccination be abated. The danger from vaccination is comparatively slight. Modern methods have reduced the possibility of secondary infection to a minimum. Thus the former arm to arm method of obtaining virus has been replaced almost entirely by the use of that obtained from the calf direct, thereby eliminating the transmission of blood diseases—especially syphilis.

The serological test to which the animals supplying the vaccine are put insures their health and removes the danger from glanders, anthrax, tuberculosis, etc., and now these animals are still further protected by a preliminary course of bacterin treatment against streptococci and staphylococci infection. The menstruum, containers, etc., are all prepared so as to insure perfect cleanliness and when the inoculation is made in a surgical manner it is almost impossible for serious results to develop, as the pure virus in only exceptional instances produces anything like a serious reaction. It has been shown that in most cases where secondary infection does occur it is produced by dirty dressings and scratching and not by an infected virus.

If a patient is subject to eczema a severe generalized reaction may result and the same thing can happen if the pus from the vesicles is smeared by the fingers or by the application of vaselin over the site of inoculation.

Very weak marasmic infants should not be vaccinated until they become stronger—unless the disease is prevalent.

Revaccination is indicated whenever there is danger of infection.

To hasten scab formation, the blister may be painted daily after the fifth day with one-half per cent picric acid solution in fifty per cent alcohol.

The New Vaccination Law of New York State

The amended law provides that no child shall be admitted into *any* school in a *first* or *second-class* city unless it has been vaccinated.

The law further provides that vaccination shall be performed only by a regularly licensed physician, and in such manner as is prescribed by the State Commissioner of Health; that no vaccine virus shall be used unless produced under license issued by the Secretary of the Treasury of the United States and accompanied by a certificate of approval by the State Commissioner of Health. Every physician performing a vaccination shall also make a report to the State Commissioner of Health upon a form furnished by the Commissioner within ten days of the date of vaccination.

The vaccine virus shall be used within one year of the time it is issued for use and not later than the date (stamped upon each vaccine virus outfit) when the virus should be active.

Age at Which Vaccination Should Be Performed.—It is recommended that every infant should be vaccinated during the second six months of life [1] *and only when in good health;* and that all persons be revaccinated whenever smallpox exists in any community. It is also recommended that vaccination be performed, insofar as is possible, between the months of October and June. The investigation of the accidents and complications very rarely following vaccination shows that they are more likely to occur during the summer months and in children who are running about.

Cleanliness.—Cleanliness is absolutely essential. The site of vaccination and the physician's hands should be thoroughly cleansed with soap and water and allowed to dry. When the child is dirty it is recommended that it be given a full bath and dressed in clean clothing.

Instrument to Be Used.—The only instrument to be used is a new needle with a sharp point sterilized by boiling or by heating in a flame.

Technic of Vaccination.—Vaccination should be performed on the outer surface of the upper arm opposite the insertion of the deltoid muscle. The outer surface of the calf may be used, but it should be remembered that this site is more likely to be rubbed and is thus rendered more liable to infection. A small drop of vaccine is placed on the spot that has been cleansed and dried, and then with the new sterile needle, scalpel or platinum scarifier a scarification is made, not larger than the end of a match, or a single scratch not more than a quarter of an inch long, the scarification or scratch being made through the drop of virus. (*Cross hatching or more than one scratch must not under any circumstances be employed.*) The vaccination should be allowed to thoroughly dry in the air. No dressing

[1] In a clear environment the author does not recommend vaccination until the child is 4 years old. When smallpox makes its appearance all unvaccinated children should be innoculated at once.

should be placed on the arm. In the event of a "take," a dressing of clean sterile gauze or clean cheesecloth may be fastened to the undergarment to protect the vaccination. The patient must be warned not to scratch or disturb it. No shield of any variety should be used. The scab should not be removed.

Dressing.—If the dressing becomes soiled by oozing from the vaccination the physician should remove the dressing and wash the area with a sterile salt solution or with cool, freshly boiled water. When the dressing is changed care should be observed not to touch the vaccination. A fresh sterile dressing on the inner side of the sleeve should protect the vaccination as before. In the usual course of vaccination dressings should be changed only a few times, but if there is a great deal of oozing they should be changed daily. *Never use shields.*

Normal Course of Vaccination.—If these directions are carried out a successful vaccination will take a normal course, which is as follows:

For three or four days there will be no sensation, except possibly a little itching. Then a small red area forms, in the center of which a spot like a blister appears, and there will be some tenderness and redness about the vaccination area. At this time there may be some slight soreness in the armpit and some feeling of illness. There is usually some oozing of yellowish material. The blister gradually dries up and a thick scab forms. The redness and tenderness gradually subside, and after two or more weeks the scab falls off, leaving a pitted scar. In a few cases the vaccination takes a somewhat severer course, causing more pain and discomfort than usual, and some fever.

Inspection and Report.—The vaccination should be inspected by the physician who performed the same between the fifth and ninth day after vaccination, and a report must be made on the form prescribed by the State Commissioner of Health.

Treatment of a Case of Smallpox

The patient must be quarantined. The sickroom should be as airy as possible, and all precautions enumerated under Summary of Prophylaxis, at the beginning of this chapter, are to be taken. All persons in the environment of the patient are to be vaccinated. The patient should be vaccinated if *seen early,* as this procedure seems to favorably affect the course of the disease.

The *diet* should be a fever diet with plenty of cooling drinks.

High temperatures are combated by hydrotherapeutic measures. (*See* Bedside Technic.) An antipyretic drug may be given occasionally.

In anticipation of *crust formation,* it is wise to cut short all hair, thus rendering the parts more accessible to subsequent local measures.

The *eyes* require frequent cleansing with boric acid water; also the nasopharyngeal toilet should be practiced throughout the disease.

For the *cervical adenitis and angina,* cold applications around the neck will afford relief.

A mask of gauze kept wet with a weak antiseptic solution can be worn over the face for the purpose of subsiding *local irritation.*

Drugs.—In the first stage of the malady a thorough intestinal purge should be given. Dilute hydrochloric acid may be administered several times a day to aid digestion.

Constipation is to be overcome by enemata.

The indications for *stimulation* are the same as in the other infectious fevers.

Complications are treated as they arise.

Varicella

(*Chicken Pox*)

Clinical Course.—Varicella, or chicken pox, is an acute contagious eruptive fever limited in about ninety per cent of the cases to the first two decades of life. It usually runs a very mild course, but especially in adults may be severe and even simulate smallpox in gravity of symptoms. The incubation period is about two weeks. The onset is marked by fever and gastro-intestinal disturbances and the eruption appears in the first twenty-four hours either on the trunk or on the face. The rash is first macular but soon becomes vesicular. Succeeding crops appear for the first two or three days of the disease. The vesicles dry up without pustulation and the scabs drop off in about a week or ten days. Usually there is no scarring.

Prophylaxis.—Prophylactic vaccination for chicken pox has been tried with apparent success. The material is taken from a vesicle or pustule. Systemic disturbances were not observed. The local reaction is mild.

The disease requires isolation until the skin is free from desquamation. Just how the virus is spread is not known, but the respiratory passage should be kept as clean as possible. Epidemics in schools and hospitals sometimes take on serious proportions and are hard to stamp out.

Treatment.—The disease generally is too mild to require any especial treatment except isolation, opening of the bowels and restricted diet. The itching may be intense and require some soothing lotion. Due to the scratching, secondary infection may occur, the gravity of which will vary with the virulence of the infection and the resistance of the patient. One attack usually gives immunity against subsequent attacks.

Weil's Disease

Etiology.—Weil's disease is an acute epidemic infective jaundice, occurring chiefly in cities among middle-aged males. The handling of raw meats appears to be conducive to the production of the disease, and since Jaeger has associated it with the Proteus fluorescens—one of the putrefactive group of organisms—this connection is in a great measure explained. The organism has become of considerable interest besides, as the etiological factor of some cases of fatal jaundice in the newborn, and the Japanese plague known as *kedani,* which has a mortality between forty and fifty per cent.

It is associated with decaying animal and vegetable matter and probably gains entrance into the human organism with the food and possibly by the bite of infected insects.

Clinical Course.—The onset of Weil's disease is sudden, with chills and rigors. The temperature rises rapidly and remains up throughout the disease; at the end of ten days or two weeks it comes down by crisis or rapid lysis. There is not much disturbance of the gastro-intestinal tract except an occasional diarrhea. Jaundice usually commences on the second day and develops varying grades of severity. The kidneys are usually considerably affected and the urine contains albumin, casts, epithelial cells and red and white blood cells. Occasionally suppression with uremic symptoms is observed. The nervous effects are pronounced. There is usually much depression, and pain throughout the body. Occasionally a delirium is developed. Recovery is the rule in the large majority of the cases, though a few epidemics of especial severity have occurred.

Treatment.—The treatment is symptomatic. An initial dose of calomel and salts, followed by a continuous use of the salicylates, comprises the internal medication. On account of the kidney conditions the diet must be adjusted as for acute nephritis. The muscular pains may be relieved by warm applications or liniments and the headache by moist cloths applied to the head.

If delirium or great restlessness occurs antipyrin or small doses of opium may be necessary. Resina podophylli in 0,01 gm. doses may help to restore the flow of bile toward the close of the disease.

Prophylaxis.—Prophylaxis requires elimination of putrefying material and isolation of the patient.

Yellow Fever

This is an acute infectious disease characterized by severe toxemia, jaundice, albuminuria, and a pronounced tendency to gastric hemorrhages.

Etiology.—The specific bacillus has probably been isolated by Sanarelli, though this is as yet disputed.

All races and ages are liable to the disease, though the negro is less susceptible. Residents of localities where the disease prevails are less susceptible than strangers.

The Yellow Fever Commission of the United States Army has demonstrated conclusively that the disease is transferred by a mosquito, *Stegomyia fasciata,* previously fed on the blood of infected persons.

Clinical Course.—The incubation period varies from a day to a week. The onset is with malaise, fever reaching 105° or 106° F., headache and pains in the back. The pulse is relatively slow to the grade of fever present. The urine is scant; nephritic symptoms appear. Constipation is marked and moderate jaundice is frequent. A peculiar odor is noticeable about the patient; after from one to four days' time the symptoms remit. After the same period a secondary fever develops, jaundice becomes extreme, black vomit occurs and collapse and death are frequent. The mortality ranges from 15 to 85 per cent.

Prophylaxis.—Prophylaxis requires the screening of all patients so that mosquitoes cannot reach them, killing those mosquitoes that get into the sickroom and disposing of the fomites in a sanitary way.

Treatment.—The *immediate treatment* of the disease depends on good nursing and proper relief of symptoms, though a cure by blood serum injections may at any time be perfected.

Comfortable, airy, and well but not brightly illuminated rooms, wards, or tents are to be preferred. The feeding by the mouth should be with very small amounts of fluid, but if vomiting is severe feeding by the mouth should not be attempted. Resort to rectal feeding and irrigation if vomiting is continuous. The withholding of all food in the early stage is probably the preferable method in severe cases, and administering rectal saline enemata to allay the thirst. Small pieces of ice may be given by the mouth. For the pain, morphin may be required. If the temperature is high, bathing is the best method of treatment. Hot baths are to be used for the uremic conditions if they develop. Cardiac weakness may require stimulants. Complications are to be met with the appropriate treatment as they arise.

Section IV

Non-Bacterial Parasitic Diseases, Including Pellagra and Beriberi

Diseases Due to Fungi, Protozoa, Cestodes, Nematodes and Insect Parasites

Actinomycosis

(*Lump Jaw—Big Jaw*)

Etiology.—Actinomycosis is a chronic infectious disease produced by a vegetable parasite—the Actinomyces bovis or ray fungus. It is more common in cattle than in man.

Clinical Varieties.

Digestive Tract.—Characterized by small growths on the tongue, lower intestine and subsequently the peritoneum.

Pulmonary Form.—Accompanied by cough, fever and wasting with mucopurulent expectoration.

Cutaneous Form.—The lesions of this form are ulcerative, resembling lupus, but the presence of the ray fungus is diagnostic. A rare form of the disease.

Cerebral Actinomycosis.—Very rare.

Bone Actinomycosis.—Most frequently occurs in maxillae where marked swelling and abscesses with characteristic little hard white nodules develop.

Prophylaxis.—Animals affected with this disease had best be condemned for human use. Only during epidemics do any stricter precautions have to be used. Due consideration should then be paid to the fact that the ray fungus is directly transmitted by various grains—barley, oats and rye.

Treatment.—Vaccines have been used, but as yet nothing authoritative can be said of the results. For this infection nothing has been so effective as the prolonged administration of *iodids* combined with local surgical in-

terferences. As much as 40 to 60 grains of potassium iodid a day is administered; also the sodium iodid because its action is less toxic upon the heart. *Arsenic* to the limit of tolerance, and *copper sulphate* has also been given internally.

Locally free incision, curettement and drainage is the rule except where cosmetic reasons, e. g., on the face, dictate otherwise. Sometimes alone or combined with the surgical treatment, topical applications in the form of tampons of tincture of iodin, silver nitrate, bichlorid of mercury or iodoform are used. Treatment with *x-rays* is highly recommended. To guard against recurrence, potassium iodid had best be given two or three months after the lesions have healed.

Aspergillosis

This is a rare parasitic disease caused by the destructive invasion of the spores of a species of fungus—Aspergillus fumigatus—of the genus Aspergillus. The lungs are attacked more frequently than the external auditory canal. Pulmonary aspergillosis is usually engrafted upon tuberculosis.

Clinical Varieties.—There are two clinical varieties of pulmonary aspergillosis:

(*a*) Chronic tubercular type.

(*b*) Type resembling emphysema and bronchitis.

Prophylaxis.—Inasmuch as the parasites are found in spores of infected grain, patients must be removed from a poisonous atmosphere which may contain dry grains or vegetable material.

Treatment.—No specific treatment exists. Locally *iodin* or any parasiticide, and internally the *iodids* and *arsenic* are effective. The treatment of the primary infection which is often tuberculous, of the maintenance of general health and relieving particular symptoms, are all essential. Thus improvement of hygiene, full diet and the usual drug treatment which includes cod-liver oil, the administration of antispasmodics for asthma, of creosote and turpentine for bronchitis, should not be forgotton.

Sporotrichosis

Sporotrichosis is a chronic infectious disease characterized by the development of gummatous and sluggish multiple abscesses in the skin and subcutaneous tissues. A chronic lymphangitis is a frequent complication. The etiological factor is a fungus or hyphomycete of the genus Sporotrichium.

Prophylaxis.—Personal prophylaxis includes the proper protection

of abrasions and little cuts on the hands by those whose occupations bring them into contact with unclean vegetables and various animals and insects —caterpillars or flies—where the fungus thrives.

Treatment.—Surgical treatment rarely helps. Aspiration—not incision—of abscesses is indicated. Internally the *iodid of potassium* up to 90 grains daily, and locally *iodin* are indicated. If the iodids are badly borne by the stomach, rectal administration should be resorted to. The iodids should be given for a month after the lesions disappear.

Oidiomycosis

(*Blastomycosis*)

This is a rare parasitic fungoid disease of the skin,[1] distinguished by a nodular eruption which becomes granulomatous or suppurative. The discharge or scrapings shows a double-contoured organism. Occasionally the internal viscera are involved. The disease may last for years.

Clinical Divisions.—Cutaneous.—Lesions are pustular and become ulcerative.

Pulmonary.—Cough, fever and occasional hemoptysis are the cardinal symptoms, very similar to tuberculosis.

Symptoms.—Diarrhea is one of the chief symptoms.

Treatment.—The internal treatment consist of heavy doses of the *iodids,* preferably potassium iodid—50 to 150 grains daily in three doses. Locally the x-ray has been found most effective. Surgical treatment gives negative results so far as the actual extirpation of the disease is concerned. For the relief of pain, curettement and antiseptics help.

Amebiasis

(*Amebic Dysentery—Entamebiasis*)

Etiology.—This is an acute or chronic infectious disease—endemic in the tropics and sporadic in the temperate regions. It is due to the ulcerative invasion of the lower intestinal tract, less frequently the liver, spleen, brain and other viscera, by several varieties of parasitic protozoa—the Entameba dysenterica. The Entameba coli is generally conceded to be harmless.

Clinical Varieties.—Acute Form.—In the acute form the onset is gradual or abrupt. The fever is not high; there is diarrhea and abdominal pain. The symptoms in favorable cases abate in six to twelve weeks, otherwise symptoms occur periodically.

[1] The Oidium albicans is a parasite closely associated with the oidium discussed above. It is the microörganism of thrush or stomatitis.

Chronic Form.—In the chronic type there is dull abdominal pain, tenesmus, frequent movements containing mucus, blood and pus; marked emaciation and anemia are present. The disease usually lasts for months and years. Death may result.

The stools *in both varieties* contain the parasitic ova and therefore clinch the diagnosis.

Concerning complications, hepatic abscess is a most frequent event. Intestinal perforation at the site of an ulcer with subsequent local or general peritonitis is not uncommon. Abscesses in the brain, liver or spleen are occasional.

Prophylaxis.—Of primary importance is the installation of a pure water supply and its proper protection against contamination when it is secured. In the event of this being impossible all drinking water must of course be boiled. The same solicitude might well be observed toward water used in bathing. All food of uncooked varieties had best be boiled. Patients should be isolated and their excreta subjected to vigorous disinfection.

Treatment.—In a strict sense there is no specific. But there are two drugs, ipecac and emetin, which, singly or combined, have yielded extremely good results. Ipecacuanha is administered orally in doses of 5 to 10 gr. (0,3-0,6) t.i.d. The pills are keratinized or coated with salol, one-eighth of an inch thick. If they pass through the intestinal tract, the coating can be reduced to one-sixteenth of an inch.

To reduce the emetic disadvantages of the drug various precautions are used—the patient should lie quietly in bed in a dorsal position and a hypodermic of morphin may be given before he receives ipecac; an ice bag or mustard plaster to the epigastrium also helps; a fast should be instituted four hours before the drug is administered. After two weeks it is best to limit the dosage to five grains t.i.d. and discontinue when the ameba can no longer be found in the stools.

The other valuable adjunct in the treatment of amebic dysentery is emetin hydrochlorid. It obviates nausea. It can be administered hypodermically, 1/3 or ½ gr. t.i.d., or gr. 1 in 5 c.c. of saline solution t.i.d. intravenously for three days.

Local treatment by enemas is reserved for stubborn cases. Quinin (1 to 1,000), potassium permanganate (1 to 5,000) or plain water or saline in two liter enemas, twice a day for two weeks, are all recommended. The enemas should be given in the dorsal position with the hips elevated. Flushing of the colon with solutions of one-half per cent sodium hypochlorite solution is said to be effective in twenty-four hours.

Aside from the specifics either the use of morphin hypodermically or of Dover's powder has a well-defined place in the therapy of the acute type of the disease. It allays the excessive peristalsis and relieves abdominal pain. Bismuth is of decided benefit in persistent diarrhea.

Intestinal antiseptics are futile. For local treatment of ulcerative areas in the lower bowel topical applications of argyrol—15 per cent—can be employed. Starch and opium enemas are useful for their soothing effect. Iron for anemia, alcohol or strychnin for their tonic effects, complete the drug treatment of amebic dysentery.

Removal from the tropics to more temperate regions is frequently followed by improvement in convalescent cases.

Diet is an important factor. In acute cases it had best be soft or liquid—milk, albumin water, eggs and rice, etc.

In the chronic stages, while a full diet is advisable it must be selected from those articles which leave the least residue.

The best interests of the patient demand his confinement and the maintenance of quiet during the acute stage of the disease. On the other hand during the chronic stage it is best to allow a moderate amount of exercise.

The treatment of the complications is a broad subject but inasmuch as hepatic abscess, intestinal perforation, peritonitis, etc., are mostly surgical considerations, so far as their relief is concerned, it is not within the province of this discussion. It is claimed that full doses of ipecac can inhibit the formation of liver abscess.

Trypanosomiasis

(*Sleeping Sickness*)

An endemic disease of western tropical Africa caused by the bite of tsetse fly which conveys into the blood and lymphatic system the protozoon Trypanosoma gambiense. The first stage is quiescent and insidious. It may last from three months to three years.

Symptoms.—Enlargement of lymph nodes, especially the posterior cervical, is the chief symptom.

The final stage gives rise to the name of the chief characteristic of this disease—sleeping sickness. There is headache, polyadenitis, great wasting, apathy, perhaps slight pyrexia, often subnormal temperature.

Prophylaxis.—Inasmuch as the treatment proper has been found so lacking in results, prophylactic measures are extremely important. They concern themselves with three factors: the tsetse fly (Glossina palpalis), the parasite and the host—human and animal.

The tsetse fly frequents the thick jungle and brush-covered areas on the shore of lakes and rivers. In disease of infested areas therefore the shore should be cleared of trees and brush at least for a distance of fifty feet. Eucalyptus and citronella, which the tsetse fly abhors, should be cultivated, as well as its animal enemies. Animals like the antelope and crocodile, whose blood the protozoön feeds on, should be exterminated.

Infected and healthy persons should be separated and communication be made as limited as possible. Houses should be screened and the body surface exposed no more than necessary as further means of protection against the fly. All infected persons should be treated. Preventive inoculations of dead trypanosomes have been found fruitless, but prophylactic doses of arsenophenylglycerin have some claim to merit.

Treatment.—As yet no definite cure for this infection has been found. The most efficient of trypanocidal therapy includes a regimen which combines *arsenic* with some other trypanocidal drug. Arsenic alone in the form of the atoxyl, according to M. Gamble, has apparently cured fifty per cent of cases after a prolonged treatment. Either four grains daily or seven and one-half grains twice a week are injected. Intravenous injections of 4 c.c. of a 2 per cent tartar emetic solution should be tried.

The constant danger of optical injury and other organic damage in the use of arsenic, particularly in the large doses, must be borne in mind. On the other hand the prolonged action of weak doses of a single trypanocide, as in the treatment of our stubborn malarias, tends eventually to become weaker on the parasite involved. Therefore the alternation of the atoxyl injected hypodermically or intravenously in a ten per cent solution, alternating daily with intravenous doses of tartar emetic—gr. 1—or some other antimonial compound, is recommended.

Among the most effective subs itutes for the atoxyl is *soamin* (sodium aminophenyl arsenate) 3-grain tablets, one every other day until ten doses are taken. Arsenophenyl glycerin is also recommended by Strong and Teague. Salvarsan has been employed with rather negative results. Anilin and other dyes have been tried and found most effective when used in conjunction with arsenic.

Not a little depends upon the general treatment. Removal to a healthy climate, arrangement of a comfortable cheerful environment, treatment of any attendant tropical infection and constant watching lest the patient overtax his strength, will insure the best results possible.

Febris Recurrens

(*Relapsing Fever—Spirochaetosis*)

This is an acute infectious disease caused by a spirochete—the Spirochaeta Duttoni—in the tropical form of the disease, and the Spirochaetae recurrentes in the type found in the temperate region. It is characterized by two or more febrile paroxysms of six days' duration, which are followed by afebrile intervals of the same duration. It is transmitted through the agency of a tick or louse.

Clinical Course.—Attacks are quite uniform. There is a sudden onset

with pain in the head, back and extremities. The temperature rises rapidly from 104° to 108° F. and the pulse to about 120; a coated tongue and vomiting may persist; jaundice may be present; an enlarged liver and spleen can be palpated. In severe cases there may be petechiae. On the seventh day, usually, the paroxysm ends by crisis. Collapse may follow in weak patients. For seven days there is no pyrexia, only to be followed by an attack of fever of the same character as the first. There may be from three to seven of these attacks before recovery. The spirochetes can be found in the blood during the fever attacks.

Prophylaxis.—The most effective measure consists in waging a war of absolute extermination against the vectors of the spirochetes—the bedbugs, lice and ticks. This implies the destruction of all vermin. Bed clothing and garments of the infected person should be sterilized by heat. The interior walls of the house should be scrubbed with disinfecting solution and the cracks closed up. In extreme cases in the tropics the dwelling places should be burned altogether. In epidemics the infected patient had best be isolated. Sleeping in hammocks or beds well raised from the floor is a prophylactic measure.

Treatment.—In relapsing fever, as in syphilis, salvarsan has been signally effective. It is administered intravenously in solution and the dose ranges from 0,1 to 0,4 grams, depending on the age and weight of the patient. Neosalvarsan in doses of 0,4 grams is perhaps more convenient, and because of its less violent action upon the tissues, is preferable to salvarsan. However its action is slower and not quite so powerful. There is some difference of opinion about the effectiveness of the other arsenical compounds.

Inasmuch as some of the natives who have been infected seem to manifest an immunity to the disease, a serum of immunized horses has been employed by Lowenthal and Bobraskow. The benefits are questionable.

During pyrexia, of course a fluid diet is advisable.

In hydrotherapy we have a good weapon against the fever. Treatment of symptoms is important. In collapse, stimulants are indicated, for the pain morphin is essential.

Leishmaniosis

(*Kala-azar*)

Endemic diseases caused by the protozoön parasites of the genus Leishmania are found in Southern Asia, India, Southern Italy and also Yucatan.

The most important member of this group of diseases is *kala-azar*

(dumdum fever, tropical splenomegaly). It is a chronic infectious disease characterized by the presence in the internal organs of the Leishman-Donovan bodies which, for the purpose of diagnosis can be obtained by a puncture of the spleen and liver. Progressive prostration and leukopenia are the chief signs of the disease.

Clinical Divisions.—Two types are to be considered.

In the *severe type* there is high fever with recurrences, rapid prostration, cachexia and a fatal termination in a few months.

In the *milder type* there is protracted fever and cachexia. At the end of a year or two the patient may die of exhaustion, dysentery or some intercurrent disease.

Prophylaxis.—Isolation of infected patients, disinfection of living quarters and the destruction of all vermin are essential. Research has revealed the flagellate form of the parasite in the intestine of insects—chiefly the bedbug. It has also been found in the blood of animals.

Treatment.—Up to the present writing the therapy of the disease has been quite unsatisfactory. In some form *arsenic* is usually administered. *Atoxyl* can be given up to the limit of tolerance. Intramuscular injections (0,2 gm. every two or three days) are recommended. Quite recently Dr. Peterson employed salvarsan successfully in doses of 0,4 to 0,6 gms. intravenously, several injections being required. His best results have been obtained with oriental sore which is a local form of Leishmaniosis. Daniels advises the use of the antimony compounds by the intravenous or rectal route. Quite recently *tartar emetic* has been lauded as a specific in Leishmaniosis in children and adults. Adults receive 4 c.c. of a two per cent solution intravenously—this to be increased by 1 c.c. at each subsequent injection until 10 c.c. are administered.

Concerning quinin there is no unanimity, and the best authorities attribute any good results which have attended its use to its antimalarial properties. Therefore, if for no other reason than to exclude any attendant malarial infection, it should always be administered. The best treatment, according to Castellani, is the administration of quinin (gr. xv, t.i.d.) by mouth or quinin urea hydrochlorid (grs. ii) by intramuscular injections, supplemented by a course of quinin cacodylate injection or atoxyl injections until symptoms of cinchonism set in.

Bahadur claims originality for the use of *antimony* in kala-azar. One grain of metallic antimony is made into a thoroughly homogeneous paste with sufficient liquid glucose in a glass mortar and then mixed with 20 c.c. normal saline. This is injected into the vein. Any sediment of antimony left inside the syringe is subsequently mixed with normal saline containing 5 per cent glucose, and then injected into the vein. This process is repeated several times until no antimony is left inside the syringe. About 40 to 45 c.c. of normal saline is required to inject 1 to 1½ grains of metallic antimony. So far the results are encouraging. No untoward

results, such as plugging of the capillaries, have followed the intravenous injection of metallic antimony. Sometimes the patient suffered from rather severe diarrhea, which, however, stopped in twenty-four to forty-eight hours.

Removal to another climate often results in a marked improvement when used with other general therapeutic measures. For the bleeding of the gums calcium chlorid should be used locally. Against dysentery moderately large doses of bismuth subnitrate after each stool as also astringent enemas are directed.

Distomiasis

This disease is caused by parasitic trematodes (flukes) and are found most frequently in the tropics and to a smaller extent in the temperate regions. The varieties are numerous. For purposes of clinical classification they are arranged in four types.

Clinical Types.

(*a*) Pulmonary Distomiasis.—Pulmonary distomiasis is found most often in Eastern Asia. The organism is a small reddish worm about 10 mm. long.

Symptoms.—The cardinal symptoms are cough and profuse expectoration which contains much mucus, ova and frequently blood. Constitutional symptoms are usually slight.

Prophylaxis.—As the eggs from the intestine of the infected domestic animal, be it sheep or dog, are passed with the stool, they may become mixed with drinking water or attached to plants. Therefore it is most important to avoid too intimate contact with domestic animals, to sterilize drinking water by boiling and to remove uncooked foods from the dietary.

Treatment.—Treatment up to the present time is ineffectual. Removal of the patient to another climate to secure him against further infection and careful management of his general condition may raise the patient's resistance to the point of killing off the infection.

(*b*) Hepatic Distomiasis (*Liver Fluke*).—Several varieties are found in Northern Asia and Japan, but rarely in America. In large numbers the parasites are present in the gall-bladder and bile ducts; thus the ova get into the stools and so are an aid to diagnosis.

Symptoms.—Local dilatation with sacculation of the walls of the bile ducts follows, accompanied by an interstitial hepatitis. Diarrhea which eventually becomes chronic, enlargement of the liver and intermittent jaundice are the chief symptoms. Edema, anasarca and ascites are terminal events.

Prophylaxis.—The same as for Pulmonary Distomiasis.

Treatment.—Treatment is also unsatisfactory. Salol has been sug-

gested. Expression of the gall-bladder through a laparotomy incision, so that the worms will be forced into the intestines, has been advocated.

(*c*) Intestinal Distomiasis.—Several varieties of trematodes have been observed in the intestine of man in Africa and Asia.

Symptoms.—The chief symptoms are bloody diarrhea with vomiting, emaciation and fever.

Prophylaxis.—The life history of these parasites is unknown but the same precaution about ingestion of water and uncooked foods holds true as above.

Treatment.—In the hope of attacking the parasites in the lower bowel intestinal injections of quinin and sodium hypochlorid (1 to 500) has been advocated.

(*d*) Bilharzia (*Hemic Distomiasis*).—The blood fluke is found extensively in Egypt and less frequently in other parts of Africa and Asia.

The avenues of invasion are through abrasions in the skin or body orifices while bathing, or finally through drinking contaminated water. The ova transmitting themselves into blood vessels are conveyed to the portal vein, thence to the venous plexuses of the pelvis and so into the walls of the bladder, rectum and other viscera.

Clinical Divisions.—Where the bladder is involved there are hematuria, pain and tenesmus. Where the rectum is attacked the stools contain blood and pus.

Prophylaxis.—The water supply must be protected. Therefore drinking water is to be sterilized by boiling; bathing in suspicious waters is to be forbidden.

Treatment.—The male fern is used apparently on the principle that it is better than nothing. The diet should be flat. Water in quantities should be ingested by the patient. Urotropin and other urinary disinfectants seem to have no influence on the hematuria. For the cystitis warm solutions of two per cent boric acid are best. More serious bladder complications, e. g., stone and malignancy, are treated surgically. When the rectum is attacked enemata of infusion of quassia are recommended. The papillomatous growths in the rectum or vagina should be scraped. No violent exercise should be permitted—especially in exacerbations—when patients must be confined to bed.

Prognosis.—Recovery from this infection is the rule.

Filariasis

Filaria are nematode parasites, found in the tropics and subtropics, which live in the serous cavities and subcutaneous tissues of the host. The Filaria Bancrofti and Filaria loa are the most important. The parent

worms are 50 to 100 mm. in length and may live for years in the lymphatics.

Filaria Bancrofti may lie latent in the blood and lymphatic glands for a shorter or longer period without manifesting signs of their presence. Eventually blocking of the lymphatics by the parasites or their ova results in chyluria and elephantiasis.

The parasite can be found in the blood at night.

Prophylaxis.—Recent work by Manson and others shows that mosquitoes are carriers; they should therefore be destroyed by scientific methods as thoroughly as possible. Patients ought to be protected from further bites of the mosquitoes by netting. In deference to the old idea of the origin of this disease, drinking water should be thoroughly boiled before use, since the mosquitoes are believed to deposit their eggs in pools.

Treatment.—Salvarsan has been used to fight this infection, but the proportion of successes and failures are about even. Otherwise drug treatment is so far a failure. In this connection may be mentioned Osler's idea concerning the doubtful wisdom of therapeutic measures which would leave the body organism overwhelmed with numerous dead parasites.

The treatment of symptoms is important. When lymphangitis of an extremity or any other part develops, the patient should be put at rest, his bowels purged and a limited milk diet instituted. The limb should be elevated, and after the acute symptoms have subsided massage and bandaging of the part will reduce thickening as much as possible. For chyluria, all fatty food should be removed from the diet, the bowels purged and the patient put to bed.

The customary procedure is to cut into the affected part and carefully remove the parasite without rupturing it, as this accident usually is followed by a violent reaction.

Filaria loa is a less serious variety. It frequents the connective tissues especially the conjunctivae. The symptoms are transient. There is premonitory feeling of irritation in the affected part followed by edema.

Ankylostomiasis

(*Hookworm Disease*)

Etiology.—Uncinariasis, another and more proper synonym for this disease, is due to the invasion of the nematode Uncinaria, of which there are two species, an Old World type—the Ankylostoma duodenale—and a somewhat shorter New World type—Necator Americanus.

The parasites attach themselves firmly to the mucous membrane of the small intestine by their heads, which have a number of sharp hooks

and teeth. Their ova containing the curled parasites are characteristic. These larvae are passed in great numbers with the stool. Shoeless human beings, having abrasions on their feet, pick up these ova which pass into the blood, are thence carried into the lungs, trachea and throat and are swallowed. The ova can also be swallowed directly.

Symptoms.—*Light cases* are characterized by headache, abdominal discomfort and indisposition to exertion. The dermatitis on the sole of the feet which has acted as the portal of entry is known as the ground itch.

Moderate cases have all the symptoms of the preceding class in exaggerated form with the additional development of anemia.

Severe cases have marked symptoms, as above. There is also enlargement of the liver and spleen, loss of muscle tone, edema, a peculiar muddy complexion and great prostration.

Prophylaxis.—In infected districts the inhabitants should be made to wear shoes. The water supply must be protected from contamination. Drinking water must be sterilized by boiling. No uncooked food should be eaten. All suspected fecal matter must be devitalized. Patients must be taught to use their assigned places of defecation, and in mines where this is impossible, a pail system of latrines should be enforced as rigorously as possible. In infected soils or mines, salt water or a one per cent solution of ferrous sulphate should be used to flood affected areas.

Treatment.—*Thymol* is looked upon as a specific. For two days preceding the treatment the patient had best be put on a light diet. The previous night a saline laxative should be administered. No breakfast should be given on the day of treatment. The patient should now receive thirty grains of thymol, followed two hours later by a dose of the same amount. A saline—magnesium sulphate, one ounce—can be given two hours after the last dose. Castor oil is often substituted for the saline, but some claim that the oil increases the chance of absorption of the thymol and its toxic effects. The saline carries down the mucus better than the oil. The parasites are often embedded in the mucus. Untoward effects of the thymol should be watched for in patients weakened by organic disease and old age.

The treatment should be repeated every four days until the ova disappear from the stool. Thymol can be given in capsules or in gelatin-coated pills. The fact that it is soluble in water, 1 to 1,000, and more readily in oils and fats, should be remembered. For children smaller doses of thymol are indicated.

Beta-naphthol, which also is a remedy for uncinaria, is given in a fasting condition in fifteen grain cachets every two hours, for three doses. Then a saline is given, as in the administration of thymol. Other useful drugs are the *male fern* and the *oil of eucalyptus* with castor oil.

A cheap and efficient substitute for thymol is the oil of chenopodium, gtt. xvi, every two hours, for three doses, for the adult; for the child the

dose must be regulated. If signs of depression occur, active purgation must be started and strong coffee given by mouth or rectum. Depression following the use of thymol can be treated the same way.

For the symptomatic treatment we resort to iron in the shape of Blaud's pills for the anemia. The phosphates can be used to combat the nervous depression.

Strongyloides Intestinalis Anemia

The parasite, strongyloides intestinalis, also a nematode, is most often found in Southern China, commonly in Italy and occasionally in Germany. The worm fastens its head in the mucous membrane of the intestine, and, if numerous, can produce diarrhea and anemia.

Prophylaxis.—It is the same as the prophylaxis against hookworm disease.

Treatment.—*Thymol* is often used, but the results are negative in the majority of cases. Osler suggests a remedy which has yielded good results: flowers of sulphur, gr. 15 in capsules, containing equal parts sugar of milk, t.i.d.

Teniasis

Teniae belong to the cestode type of parasites and are long flattened worms which are united to form a long row of individuals. The first member is the head or scolex which has suckers and in certain varieties hooklets; the other members, proglottids, are derived from it by budding. Each proglottid is hermaphrodite and produces an enormous number of eggs, any of which may migrate into the tissues or organs and there produce the larval form of the parasite, *cysticercus.* It is the metabolic processes of the parasites which produce injurious effects on the human host.

Taenia saginata or *beef tapeworm* is the most common. Its head is provided with four suckers and it is often twenty feet in length. Its presence is signalized by the appearance of ova and segments in the stool. *Taenia solium,* or *pork tapeworm,* is rare in America but quite common in Europe, where raw or partially cooked pork is eaten. Unlike the beef worm, the head is provided with hooklets and it is about one-half as long.

The larva or *Cysticercus cellulosa* of *Taenia solium* occasionally occurs in the human host, and if numerous enough can produce definite symptoms. Patients complain of stiffness and weakness when the muscular system is invaded. Less frequently it has been seen in the eye and brain. While the *cysticercus* of *Taenia saginata* also occurs, it is quite rare and the symptoms are not so marked as in *Cysticercus cellulosa.*

Bothriocephalus latus, the third variety, is common in Finland and

rare in America. It is acquired by the habit of eating raw fish. The clinical and blood picture resembles pernicious anemia.

Prophylaxis.—Prophylaxis is obtained by thorough inspection for cysticerci in both pork and beef. The cysticerci in measly pork are white but the cysticerci in beef are quite obscure.

Meat and fish should be well boiled before eating.

Dejecta from a patient should be burned. The patient should scrub his hands thoroughly after contact with the anal region.

Treatment.—The treatment resolves itself into three stages: (1) preparatory, (2) anthelmintic treatment, (3) expulsion.

(1) *Preparatory Stage.*—To clear the intestine of as much débris as possible the patient should be put on a fluid diet for the twenty-four hours previous to the administration of the anthelmintic. A saline, e. g., magnesium sulphate—3ii—should be given the night before. Since castor oil is said to leave the mucus in the intestine, and since the worm can lodge in mucus the saline is preferable. If there is no result a soapsuds enema can be given in the morning.

(2) *Anthelmintic Treatment.*—The male fern (*felix mas*) is certainly our most effective remedy. It is dispensed singly in the form of the oleoresin or liquid extract in doses of one or two drams divided equally into two doses, given two hours apart. Its action is calculated to paralyze the head of the worm, thus releasing its hold on the mucous membrane of the small intestine where the worm in man generally lodges. Toxic symptoms of an excessive dose include those of gastro-intestinal upset, blindness and collapse. Unfavorable symptoms can be combated with whisky, brandy, caffein or strychnin. By many the contention is made that castor oil should not be given to expel the worm on the ground that it unites with the toxic principle of the male fern and its absorption is thus promoted and toxicity produced. This is ridiculed by others.

(3) *Expulsion of the Parasite.*—Two hours after the last dose of the anthelmintic, a saline should be given. The bowels now begin to move. The stools should be passed into a warm pan and, after straining, the remainder should be saved for the purposes of examination. If the worm is not entirely passed a saline enema can be given.

Pomegranate rivals the male fern in efficiency. Two ounces of *fresh* pomegranate bark in a pint of water are boiled down to one-half a pint. The patient has been prepared in the same manner as in the case of the male fern. The patient also should be given an enema the previous night. At 6 a. m. on the day of treatment four ounces of pomegranate decoction are administered; one-half hour later he is given a tablespoonful of castor oil, and in another half hour the remaining four ounces of the decoction; in thirty minutes this is followed by one ounce of castor oil. The castor oil can be given with lemon juice or coffee. A saline enema may be substituted.

Other anthelmintics, more or less serviceable, are pumpkin seeds, tannate of pelletierin, turpentin, chloroform.

Some combinations of the drugs are often very effective.

℞	Oleoresin male fern	ʒii	8,0
	Ext. kamalae fl	ʒii	8,0
	Chloroform	gtt. x	0,6
	Croton oil	gtt. ii	0,12
	Castor oil q.s. ad	℥ii	60,0

Give in two doses, one-half at 7 a. m., the remainder at 9 a. m.

℞	Pelletierine tannate	gr. iv	0,25
	Oleoresin male fern	mn. xxx	2,0
	Chloroform	mn. v	0,3
	Syrup	℥i	30,0

Take in one dose. Follow with saline laxative, fasting in the meantime.

Should the worm not be expelled, the remedy can be given a second time after a week of preliminary medication, as follows:

℞	Tinct. asafetid Spts. terebinth Tinct. valerian ether	āā ʒii	8,0

15 drops 3 times a day.

During this week the patient should frequently eat pumpkin seeds and herring salad, also strawberries if they are in season.

Children receive the same treatment but smaller doses.

Echinococcus Disease

The Echinococcus parasite is the fourth member of the cestode parasites and in its adult parasitic form by far the smallest. It is common in Australia and Iceland. In America it is infrequent. The embryo after its release from the egg goes through the peritoneum to the blood vessels and thence to different parts of the body, commonly to the liver, where a cyst forms which may later bud into smaller cysts.

Prophylaxis.—Drinking water should be boiled.

Dogs showing embryos in the feces should be killed.

In infected communities all stray dogs should be killed.

Human beings should avoid too close contact with dogs and other domestic animals.

Treatment.—It is surgical consisting of an aspiration or removal of the cysts.

Ascariasis

The Ascaris lumbricoides or round worm is quite common in all ages. The male is fifteen to twenty-five cm. in length and the female twenty to forty cm. The eggs are elliptical in shape and microscopical in size. They inhabit the small intestine and may crawl out of the anus or into the stomach where they are vomited; they may cause jaundice if they crawl into the common duct. There may be nervous symptoms. Associated with these worms is a peculiar smell. The presence of the ova in the stools is diagnostic.

Prophylaxis.—All fecal matter should be destroyed or disinfected.

Children and infected patients should be taught to clean their hands after manipulating the anal region and to keep them clean.

Flies should be exterminated to as great a degree as possible.

Treatment.—Santonin has given the best results. For adults its dose is one grain, t.i.d.; for children it is one-half grain, t.i.d., with an equal amount of calomel or sugar of milk. The action of even moderate doses of santonin may be followed by symptoms of toxemia, such as yellow vision and nervous symptoms. When santonin is not tolerated thymol or chenopodium oil may be used.

Oxyuris Vermicularis

Oxyuris vermicularis (thread worm, pin worm) is probably the most common of parasitic infections. It is a nematode parasite, the male being one-quarter of an inch and the female three-quarters of an inch long. The worms inhabit the lower bowel, but they also invade the nose, bladder and vagina; here the female hatches thousands of eggs which are then passed to the exterior. The eggs are taken into the mouth with the food or from the fingers which become infected through contact with the surface adjacent to the anus. They are hatched in the stomach and passed thence into the intestines. Thus a vicious circle is established. In their nocturnal migrations to the outside world from the rectum, they cause an itching and finally a pruritus. Pin worms are common in child life.

Prophylaxis.—Cleanliness is the watchword here. With soap and water after each defecation the anus and genitals are to be washed; the hands and the finger nails are to be scrubbed frequently. Ova are frequently found underneath the finger nails. Other children in the family must be protected or treated if already infected.

Treatment.—Treatment is local and internal. The latter includes a brisk preliminary purge with a saline laxative or calomel. Then every night for two weeks a large enema should be given. The hips should be

raised, as it is necessary for the enema to reach the colon where the parasites often lodge in great numbers.

So far as the composition of the enema is concerned there is indeed a great variety: bichlorid of mercury (1 to 10,000), infusion of quassia—made by steeping one ounce of quassia chips in one pint of hot water, simple cold water, soapsuds and water, carbolic acid, are all recommended and used.

Quite recently it was found that the subacetate of aluminum given internally gives excellent results.

An enema of one ounce of garlic boiled in a pint of milk usually gives good results.

To allay the intolerable itching the phenol (three per cent) ointment is employed.

Trichiniasis

Trichiniasis is a parasitic infection characterized by the appearance of encapsulated larvae in the muscles, following the invasion of the human host by an adult nematode, Trichina spiralis, which is ingested with infected pork.

Symptoms.—The infection produces pain in the affected muscles and fever. Abdominal pain and diarrhea are present and are probably due to the parasitic invasion of the intestinal wall. Small areas of edema, especially in the eyelids, are a valuable aid in the diagnosis. Eosinophilia is also present along with a leukocytosis.

Prophylaxis.—In the slaughter houses inspection of pork must be thorough. Trichinosed meat should be absolutely destroyed. Rats should be exterminated and, dead or alive, should be kept away from the pig pen. The most recent investigation tends to blame the fecal matter alone for conveying the trichina. All pork should be cooked thoroughly before eating—the same as any other raw meat.

Treatment.—There is no drug which has any effect, once the parasites are in the tissues; but if a diagnosis can be made within a reasonably short interval after the infected meat is ingested, the patient should be given an emetic and his stomach washed out. To purge and dislodge the parasites which have passed through the stomach, calomel, 10 grains at a dose, can be given. For the pain the coal tar preparations internally and morphia, if necessary, is the best course. Hot baths and inunctions of a counterirritant, e. g., camphorated oil, are other measures recommended. Stimulants may be necessary if heart failure intervenes. Atropin relieves the profuse perspiration. Specific treatment with *immune serum* has been suggested.

Diet is important, as strength and nutrition must be maintained. In

the early stages it should be fluid, egg, meat, broths, and albumin water and later cereals in small quantities should be given.

Acarus Scabiei

(*Itch Insect*)

Itch is a parasitic disease due to mites and ticks which burrow into the skin and cause itching, subsequently producing a papular and vesicular rash.

Prophylaxis.—The patient should sleep alone and no other person should be allowed to touch his clothing.

Treatment.—There is a regular course of treatment which at least in its main principles should be strictly adhered to. The patient should be washed all over with green soap and then placed in a hot bath for thirty minutes and afterwards dried. Some form of sulphur ointment should then be applied.

℞	Sulphur praecip.....	ʒi	4,0
	Potass. carbonat.....	ʒss	2,0
	Adipis benzoat.....q.s ad	ʒi	30,0

Zinc oxid can replace the potassium carbonate if there is suppuration.

For a sensitive skin and a predisposition to eczema balsam of Peru is less irritating and more satisfactory. It can be painted on at night before retiring and washed off in a bath in the morning.

Pediculi

(*Lice*)

These are insect parasites from one to four millimeters long which bite and suck. They are found in slovenly abodes.

Varieties.—There are three varieties:

Pediculi Capitis (*Head Lice*).—This form occurs mostly on the occipital portion of head along with ova or nits. Itching and scratching follow their invasion.

Treatment.—Kerosene oil or crude petroleum kills the parasites and the nits and is therefore the handiest remedy. The head should be kept saturated for twenty-four hours. Then a good shampoo should be given.

Pediculosis Corporis (*Body Lice*).—Pediculosis corporis are found mostly in the scapular region, chest, abdomen, hips and thighs. There are

red dots, pustules, itching and scratch marks with pigmentation. These pediculi may be found on the body and in the clothes.

Treatment.—A good bath followed by an application of ammoniated mercurial ointment with the addition of some phenol (1 to 50) is the best treatment.

Pediculosis pubis (*Crab Louse*).—These infect the pubes, axilla, sternal region, beard, eyebrows and lashes. There is a pruriginous eruption.

Treatment.—The treatment is identical with that for body lice.

Prophylaxis.—Prophylaxis means cleanliness and the avoidance of contact with persons harboring lice.

Pulex Irritans

(*Common Flea*)

Fleas produce a red areolar lesion, in the midst of which there is minute hemorrhage. This variety is more common in Europe. A different variety—the cat and dog variety—flourish in the United States.

Prophylaxis.—Inasmuch as they spread plague and other diseases they should be exterminated. Thorough scrubbing of the interior of houses, including the cracks of floors, with ordinary soap and hot water is efficacious; fumigation with formaldehyd or sulphur vapor is effective. These measures are directed to the breeding places which are thus rendered untenable.

Treatment.—An ointment containing phenol (3 per cent), or any antipruritic lotion, can be applied to the lesions with benefit.

Harvest Rash

Harvest rash is a papular, urticarial eruption produced by the burrowing of the head of the harvest bug. It is usually localized on the lower extremities, the ankles and feet.

Treatment.—A warm bath should be given a few hours after the eruption appears. Rub the lesion with carbolized vaselin or sulphur ointment. A moist application of bichlorid of mercury (2 to 1,000) can be used. The parasite should be extracted with a fine sterile needle.

Myiasis

(*Fly Larvae*)

Myiasis is a parasitic infection characterized by an invasion of the skin, subcutaneous tissues, and more rarely the nose and gastro-intestinal

tract by ova or larvae of dipterous insects. The more serious lesions are produced by the flies of the tropical region.

Treatment.—Prompt measures must be taken. Whether the larvae invade the skin, mucous membrane or intestine it is the infection which they convey that causes trouble. The diseased area should be cleared out with pure benzin and then balsam of Peru applied. Douching with carbolic acid water or a twenty per cent solution of chloroform in sweet milk is often employed. Mechanical removal with salt water and forceps are methods which find favor.

Caterpillar Rash

This is an urticarial eruption—in reality a dermatitis—which follows contact with the hairs of caterpillars or certain moths, commonly the brown-tailed moth. The hairs may be conveyed indirectly on clothing. In severe cases the lesion resembles eczema. It is said that the hairs work into the skin and carry some irritant poison.

Treatment.—Applications of bichlorid of mercury (1 to 1,000) and painting the lesions with flexible collodion are recommended. Lassar's paste can be applied to the eczematous patches.

℞	Ungt. zinci	ʒi	30,0
	Amyli pulv	ʒi	4,0
	Acid salicylic	ʒss	2,0

Pellagra

Etiology.—Pellagra is a chronic endemic disease of disputed origin, characterized by certain lesions of the skin, gastro-intestinal symptoms and severe nervous depression. The symptoms have a marked tendency to recurrence. The disease may last for years. It occurs in southwestern Europe, in the United States and occasionally in Egypt. The origin of the disease was formerly supposed to lay with the ingestion of an inferior grade of maize. This theory has recently been combated by Sambon, who holds that it is a protozoan disease transmitted by an intermediate host, the similian or Buffalo fly.

Research of the Thompson-McFaden Commission of the Post-Graduate Hospital of New York has discovered no evidence incriminating the Buffalo fly, but fastens the probable guilt on a blood-sucking insect, Stomoxys calcitrans. The Commission attributes possible modes of distribution of the disease to intimate association in the household and the contamination of food with the excretions of pellagrins.

Goldberger and Wheeler,[1] in Public Health Reports, speak of an experimental pellagra in the human subject brought about by a restricted diet—thus classifying pellagra as a deficiency disease.

Symptoms.—The recognition of the disease is not always easy. The first stages are insidious and characterized by a drowsiness and increasing physical and mental fatigue and depression. The alimentary symptoms include a coated tongue with stomatitis, nausea, vomiting, constipation or diarrhea. The skin symptoms are important—a sharply defined erythema, which is symmetrically distributed often on the dorsum of the hands. As a rule we find that the skin lesion does not go into the hair line. After the lesions disappear the skin becomes dry and pigmented. The symptoms appear in the spring or summer and disappear in the fall. The diagnosis is based largely on this occurrence of symptoms.

In the second and final stage the signs of physical and mental depression become more marked until finally there is chronic cachexia or death from intercurrent disease.

Prophylaxis.—Because of the disputed origin of the disease we cannot discuss this positively; but the fact that it is found only among the poorer classes is significant, so far as the benefits of a fresh supply of food and water are concerned.

Proper hygiene should dictate the choice of a proper site for privies and wells. Pellagrins should be isolated as much as possible.

Treatment.—No specific treatment exists. Drug treatment in the form of arsenic has its advocates. The *atoxyl* (1½ gr.) by hypodermic injection, twice or three times a week, *arsacetin* (1½ gr.) used in the same way, every two days. The results with *salvarsan* are questionable. *Fowler's solution* is given in the milder cases to the limit of tolerance. In anemic cases arsenite of iron is indicated. The use of strychnin finds its justification in the fact that pellagra presents cerebrospinal symptoms. Thyroid extract is of doubtful efficacy. Fresh bone marrow is given to promote sleep and increase weight. Vitamines in the shape of autolyzed yeast should be administered.

Hydrotherapy in the form of warm and cold baths or douches can be prescribed when indicated—the nervous disturbances are especially amenable to this kind of treatment. Medicated baths, e. g., sulphur baths, are found beneficial in skin conditions.

The removal of pellagrins from infected districts often helps and in mild cases has been known to result in a cure.

The diet should include fresh vegetables and fruit in the early cases. In chronic cases it is a problem to keep the patient from vomiting. We should institute a milk diet with the addition of eggs as soon as possible,

[1] Goldberger, J., and Wheeler, G. A., *Pub. Health Rep.*, Washington, 1915, xxx, 3336-3339.

then cereals and later fresh raw meats and vegetables. It is best to prohibit corn and maize.

Symptomatic treatment is quite important. Antiseptic mouth washes for the stomatitis; for the vomiting, ice, veronal or chloretone (5 to 15 gr.); for the diarrhea, castor oil may be followed by bismuth, astringent and starch enemas if necessary; for the skin, calamine lotion—when there is

FIG. 69.—PELLAGRA. White boy four years old. Sick three months. Recovery. (Case of Dr. N. C. Womach, Jackson, Miss.)

cracking of the skin boric acid can be employed or zinc ointment applied. Morphin is said to increase irritability and therefore should not be used.

In those patients exhausted by the disease blood transfusion should be performed.

Beriberi (*Kakké*)

Definition.—This disease may be termed an endemic multiple neuritis with anasarca and muscular atrophy.

Etiology.—It is not definitely known whether or not beriberi is due to infection or whether it should be classed as a deficiency disease, associated with a polished rice diet.

Clinical Types.—

The acute pernicious form

The chronic edematous form

The chronic atrophic form.

Prophylaxis.—Contact infection need hardly be guarded against. The enforced use of unpolished rice has eradicated beriberi in many tropical localities.

Treatment.—Beriberi is an obstinate chronic malady when once acquired.

The dietary should include unpolished rice and potatoes. Vitamines may be supplied by the administration of autolyzed yeast, 30 drops in milk after each meal. (*See* Section I.)

Saline laxatives and sodium salicylate are the routine medicinal offerings in the management of beriberi. Cardiac stimulants may be required to overcome dropsical conditions.

Massage and electrical treatment are employed to stimulate atrophic musculature.

Section V

Tuberculosis—Syphilis—Carcinosis—Sarcomatosis

The grouping of tuberculosis, syphilis and carcinosis finds its justification in the similarity of some of their clinical manifestations.

1. They each run a chronic course in the vast majority of cases.
2. They invade each and every tissue or structure of the human body.
3. They each present systemic and localized manifestations and require systemic and local treatment.
4. They are not infrequently mistaken one for another.
5. To group them together facilitates diagnosis, differential diagnosis and management.

To illustrate these points we need only recall the fact that chronic bone and joint lesions often demand differentiation of tuberculosis from syphilis.

A refractory internal or external ulcerative process may be luetic, tuberculous or malignant, and tumors on or beneath the surface may be benign, syphilitic, malignant, etc. A clinical grouping or presentation of disease which facilitates diagnosis also facilitates treatment and it is for this reason that the author has devoted a special or separate section to this pathological triad.

A. Tuberculosis

Definition.—Tuberculosis was known and feared as a destroyer of life in the early history of mankind and crude preventive measures had already been adopted and practiced during the Middle Ages.

Toward the end of the 18th century "consumption" was considered highly infectious and contagious. After the fatal termination of a case the furniture, bedding, and wearing apparel of the former patient were ordered, by the authorities, to be burnt. Isolation and disinfection were practiced according to the existing knowledge of the times, and even notifi-

cation by the physicians or relatives was already in vogue, by royal decree, in Italy, in 1782.

Without a knowledge of the specific germ, inoculation experiments by Villemin in France, in 1865, proved the transmissibility of tuberculosis from one individual to another. The discovery of the specific germ, the Bacillus tuberculosis, was announced by the great German scientist, Robert Koch, in 1882. Consumption as an endemic disease exists today in all civilized countries, and wild peoples as a rule acquire the disease soon after they come in contact with the vices of civilization—as shown in the case of the North American Indian, the Negro and the Esquimo.

The Tubercle Bacillus.—We recognize human, bovine, avian, swine, fowl, and other species of tubercle bacilli. According to newer investigations bovine tuberculosis is a menace to human beings for it may cause a fatal infection, but in comparison to human tuberculosis as a source of infection, it recedes into the background. Children, however, are apt to contract the bovine form. According to Koch eleven-twelfths of all consumptives have the human form.

In tuberculous deposits in human beings the *typus humanus* is usually found. This proves transmission from human to human. But in swine the human type of tubercle bacillus may live and grow, and may then be transferred again to man when swine flesh is eaten.

In some instances the bovine type of bacillus is found in man—which proves its transmission through milk and meat. This bovine type in man is commonly found in glandular tissue near the portal of entrance of the infection, but occasionally it is found in more remote central localities where it destroys life. Tuberculosis of birds and domestic fowl is of negligible importance as regards transmission to human beings.

Predisposition to Tuberculosis

In all infections a favorable soil is necessary for the growth and activity of the infecting germ. By a favorable soil, we understand a temporary or permanent enfeebled body condition, either *inherited* or *acquired* through alcoholism, privation, disease or predisposing occupation. A tendency to disease is an atavistic phenomenon, whether or not the corresponding disease can be traced back each time to parents or ancestors.

Tuberculosis of the Lungs and Asthenia Universalis.—B. Stiller of Budapest emphasizes that *asthenia universalis* is a widespread constitutional disease, in the sense that it depends on hereditary tendency. Its attributes are: enteroptosis, nervous dyspepsia, severe disturbance of nutrition without sufficient cause, atony of the stomach with flatulence, intestinal atony, neurasthenia and flaccidity of all tissues.

The tendency shows itself in the atonic habit of the child; delicate

skeleton; long, flat thorax; oblique ribs; small epigastric angle; and, as a concomitant of the asthenic thorax, looseness of the costal girdle due to congenital defect of the tenth costal cartilage, which produces a floating tenth rib (normally fixed). In nearly all consumptives who present the phthisical habit we find a floating tenth rib and, in a greater or lesser degree, enteroptosis, nervous dyspepsia, neurasthenia and all the other above-mentioned attributes of asthenia. In from seventy to ninety per cent of consumptives dyspepsia is nothing but enteroptosis or nervous dyspepsia. The so-called "pretuberculous dyspepsia" is a severe form of nervous dyspepsia in which tuberculosis is superadded to a severe nutritional disturbance. Autopsy records show that most individuals over thirty years of age have remains of tuberculosis infection. This proves that it is comparatively easy for the organism to overcome or throw off this form of infection and that strengthening of the organism by hygienic and dietetic means is the principal indication as regards prophylaxis and treatment.

Relatively Small Size of the Heart—Predisposition to Tuberculosis in Excessive Growth.—Bouchard [1] studied the relations of bodily size and the dimensions of the heart in a large number of cases of various diseases. He also compared the average size of the heart as determined in healthy individuals and those suffering from pulmonary tuberculosis, taking into consideration in each case the individual's height, thoracic measurements, weight, etc.

As the result of these investigations he arrived at the conclusion that the small size of the heart is particularly characteristic of tuberculosis, excepting only certain types of chlorosis. In some pathological states the heart may have normal dimensions, in all others excepting only tuberculosis, it is enlarged either through hypertrophy or dilatation. The relatively small size of the heart may be caused through errors of development such as the excessive general growth that follows typhoid fever in young persons. In them the bones and muscles grow and attain a size out of proportion to the viscera, which do not take part in this sudden development. The heart and blood vessels therefore remain inadequate to subserve the bodily functions, so that the individual is pale, easily out of breath, prone to fatigue and has slight resistance to disease. Such persons easily succumb to a tuberculous infection.

Pulmonary Tuberculosis Incompatible with Mitral Stenosis.—Rokitansky [2] called attention long ago to the fact that patients with mitral stenosis seldom, if ever, develop pulmonary tuberculosis, owing to the passive congestion present in the lungs. At a recent meeting of the *Verein für Innere Medizin* in Berlin, Prof. Ernst von Leyden demonstrated the heart and lungs of a patient who had died from heart weakness as the result of mitral

[1] *Berl. klin. Wchnschr.*, Nov. 6 and 13, 1905.
[2] *Ibid.*, July 9, 1906.

stenosis. In the lungs were found old tuberculous lesions, however, without signs of recent advancement. The speaker was of the opinion that the tuberculosis might have preceded the heart lesion, and that upon the appearance of the heart lesion it became stationary. Prof. Kraus and Prof. Westenhoffer in the discussion emphasized the importance of this teaching of Rokitansky and said that they had found it almost without exception to be true.

Predisposition of the Apices of the Lungs to Pulmonary Tuberculous Phthisis.—Aside from infection, the cause of pulmonary tuberculosis in youthful individuals is to be sought in an individual predisposition due to anatomic and functional disturbance of the normal conditions around the superior aperture of the thorax. These improper conditions may be congenital, hereditary or acquired during life. The predisposition is at first purely local. Actual and functional diminution of the pulmonary apices not only favor the deposition of tubercle bacilli, but also diminish the natural powers of resistance inherent in the tissues. This predisposition determines the localization of the first tuberculous focus in the pulmonary apices.

The final outcome of the battle between the tubercle bacilli and the tissues depends on the balance of this anatomic and functional ratio in the region of the superior aperture of the thorax. Children do not exhibit this predisposition of the pulmonary apices to tuberculosis. In older individuals (fifty years of age and over) the predisposition is caused almost exclusively by inhibition of the function of the superior aperture of the thorax, due to senile changes.

The measures to be employed in combating tuberculosis should be directed, more than has been done in the past, against the development of an individual predisposition.

Infection in Tuberculosis

Paths and Modes of Infection.—According to modern views tuberculosis is acquired during extra-uterine life in the vast majority of cases.

Congenital Tuberculosis.—Infection through the placenta is possible. Tuberculosis in the mother may be transmitted directly to the child; but such transmission is so rare that from the standpoint of prevention it may, for the present, be disregarded.

The following case was reported by Dr. Martha Wollstein,[1] on account of its rarity. The mother died of advanced tuberculosis six days after labor; no autopsy was permitted, but the uterus was removed per vaginam. Cheesy areas with tubercle bacilli were found in the endometrium and muscular coats and in the placenta; there were no tuberculous lesions in

[1] *Arch. of Ped.*, May, 1914.

the umbilical cord or its vessels. The child died nineteen days after birth. The autopsy showed a few small tubercles without giant cells in the lungs, liver and kidneys. Smears from the heart's blood and umbilical vein were negative for tubercle bacilli. The infection was, however, evidently hematogenous. Wollstein, in her recent review of the subject, finds that there are reported in literature twenty cases of such placental infection, in which the facts given are sufficient to prove the case.

Ralph Waldo Lobenstine, in the Bulletin of the Lying-in-Hospital of New York City, says that not a single indisputable case of direct bacterial infection from the father is on record. Experiments have proven beyond a doubt, however, that the semen may contain tubercle bacilli in advanced general tuberculosis or severe tuberculosis of the testes. The infection is always transmitted through the placenta or decidua basalis from the maternal blood. The placenta shows in all cases tuberculous changes, but the degree of infection of the child does not, of necessity, depend upon the degree of those changes. The ovary may be the seat of the tuberculosis, but it has not been demonstrated that direct infection takes place through an infected ovum.

From all accounts heredity cannot be considered an important factor in the development and dissemination of tuberculosis. Occurring in a child more than a month old, the disease has probably been acquired. The offspring of a tuberculous mother should therefore not be allowed to take the mother's breast but should be fed either on the milk of a wetnurse or on modified cow's milk, and, if possible, should not be allowed to be with the mother or with any other tuberculous person.

Dust Inhalation.—Carelessly deposited sputum dries up to a fine powder and is inhaled in a dust-laden atmosphere.

Droplet Inhalation.—In coughing, sneezing, and forcible speaking, a consumptive expells invisible droplets of saliva containing tubercle bacilli and in this way transmission of the disease is possible. While the adherents of the inhalation theory continue to assert that the inhaled tubercle bacilli penetrate into the finest air passages, where they are especially apt to produce pulmonary tuberculosis, modern views are to the effect that phthisis is presumably never due to tubercle bacilli which have directly entered the lung, but that it is almost without exception referable to bacilli which, even in case of inhalation, have reached the lymph or blood currents by way of the pharynx, mouth or bowel, respectively.

Ingestion of the Tubercle.—It is proven that bovine tuberculosis can be transmitted by eating the meat and drinking the raw milk of a tuberculous animal. A patient with pulmonary tuberculosis may infect his own gastro-enteric tract by swallowing his germ-laden sputum. Infecting material may be swallowed with the saliva after kissing a consumptive on the mouth or caressing and kissing tuberculous domestic animals.

No infection can be conveyed from tuberculosis of the "closed" or nonulcerating variety, or after ulcerations are completely healed.

Possibilities of Infection from Table Utensils at Sanatoria.—Dr. J. Woods Price, Saranac Lake, New York, carried out a series of experiments in which he sought to determine the possibilities of infection from table utensils at sanatoria.

Forks, spoons, teacups and milk glasses in constant use by advanced tuberculous patients were used in his experiments. On the first day thirty forks and twenty-five each of spoons, tumblers and teacups were chosen immediately after ordinary good washing, but not sterilization, and cleansed with sterile five per cent sodium bicarbonate solution by means of sterile cotton swabs, and the washings distributed among fifty-six guinea pigs by subcutaneous injection. No knowledge of the intended experiment was conveyed to the hospital nurses or maids. All pigs were killed in forty-one days, and found free of any tuberculous infection. On a second occasion several months later five articles of each sort, immediately after use and before washing of any kind, were cleansed as described above and the washings injected subcutaneously into guinea pigs, two pigs to each five articles. These animals were killed in forty-one days after inoculation, and all were found to be tuberculous except those inoculated with the washings from the milk glasses, which developed no lesions whatever. Later the first experiment was repeated with the use of six articles of each kind and the washings distributed among twelve pigs—again with no resultant infection.

Flies as Agents in the Dissemination of Koch's Bacillus.—Dr. C. André, Lyons, France, has reported the results of his investigations.

Flies are active agents in the dissemination of Koch's bacillus because they are constantly going back and forth between contagious sputa, feces, and foodstuffs—especially meat, fruit, milk, etc.—which they pollute by contact with their feet, and especially with their excretions.

André's experimental researches show the following:

1. Flies caught in the open air do not contain any acid-fast bacilli that could be mistaken for the bacillus of Koch.

2. Flies that have been fed on sputum evacuate considerable quantities of bacilli in their excretions. The bacilli appear six hours after ingestion of the sputum, and some may be found as long as five days later. These flies, therefore, have plenty of time to carry these bacilli to a great distance, and to contaminate food in houses apparently protected from contagion because not inhabited by a consumptive.

3. Food polluted by flies that have been fed on sputum contains infective bacilli and produces tuberculosis in guinea pigs.

4. Flies readily absorb bacilli contained in dry dust.

5. Flies caught at random in a hospital ward produced tuberculosis in the guinea pig.

Conclusions.—The sputum and feces of tuberculous subjects must be dis-

infected; flies should be destroyed as completely as possible; foodstuffs should be protected by means of covers made of wire gauze.

The Path of the Tubercle Bacilli from the Mouth to the Lungs.—Beitzke [1] says that three different paths have been named by various observers as being the route followed by the tubercle bacillus in its way from mouth to lung. These are: (1) cervical lymph nodes, lymphatic duct, superior vena cava, heart, lung; (2) cervical lymph nodes, supraclavicular glands, pleural dome, pulmonary apex; (3) cervical glands, bronchial glands, lung. The author's experiments showed him that the glands draining the mouth and pharynx never are in direct communication with the bronchial glands, and but rarely with the supraclavicular glands.

Connection with the pleural dome also was never demonstrated. In the author's experiments in which aspiration of the germs directly from the mouth to the lungs could be excluded, it was found that the infection of the lungs when secondary to that of the cervical glands always took place through the blood stream, and therefore through the lymphatic duct and the vena cava. Observations on the bodies of infants showed that the chief and most long-standing lesion was always to be found in the bronchial glands, and Beitzke therefore concludes that in most cases the bronchial glands are the primary site of the tuberculosis invasion, while the cervical glands are a secondary affection that only in rare cases has anything to do with the origin of pulmonary tuberculosis in man. He believes that healthy unaltered lymph nodes form a filter that is impervious to bacteria and that the portal of entry in children's pulmonary tuberculosis is the lung itself or the bronchial tree, the germs gaining access to this either through the air or from the mouth, in which they accumulate through the presence of infected foods.

The relative frequency of infection by the respiratory and the intestinal tracts in cases of pulmonary tuberculosis is a mooted point that appears very difficult of determination.

Infection Through the Skin and Mucosa.—Infection through wounds and abrasions of the skin or eczematous patches takes place and may account for some cases of tuberculous adenitis and some rare instances of tuberculous arthritis. The eye (conjunctiva) and external genitals may be infected by direct contact.

Experiments made by rubbing tuberculous sputum or pure culture upon the intact, depilated, or shaved skin of calves, guinea pigs, and rabbits gave the following results:

1. The tubercle bacillus can penetrate through even the uninjured skin, and if the hair is removed or shaved this is always the case.

2. The tubercle bacillus can cause local skin changes, or may leave no

[1] *Berl. klin. Wchnschr.*, July 31, 1905.

trace of its entrance, and yet can cause a more or less high grade general infection.

3. The skin changes have a similarity to lupus; the glandular changes resemble scrofula.

4. Experiments on rabbits, where pulmonary tuberculosis was present without any trace of the point of entrance of the bacilli, speak in favor of the extrapulmonary origin of tuberculosis of the lungs.

Other modes of infection through the broken skin are: tattooing, cleansing spittoons, handling unclean instruments at autopsies or in the laboratory, ritual circumcision, etc. Auto-inoculation may take place if a consumptive suckles a sore finger.

Infection Through the Genito-Urinary System.—Infection through the genito-urinary system is a possibility in adult life but quite unlikely in children.

Mode of Infection in Children.—The avenues of infection are best considered by discussing them in their relation to the clinical forms of tuberculosis most frequently observed in children:

1. Congenital infection (extremely rare).
2. Glandular infection.
3. Pulmonary (including peribronchial lymph node) infection.
4. Peritoneal and intestinal (including mesenteric lymph node) infection.
5. Articular and osteal infection.
6. Meningeal infection.
7. General miliary tuberculosis—a form usually secondary to the principal types.

The glandular and pulmonary types are generally due to inhalation or ingestion of the virus. Primary tuberculosis of the alimentary tract is produced by ingestion of bacilli in food (milk). Tuberculosis of the meninges, bones, and joints usually has its primary focus in peribronchial nodes or in the lungs and may be looked upon as an inhalation tuberculosis.

The danger to children lies mainly in the expectoration of consumptives whose sputum in the dry or droplet form is inhaled or carried by their hands or other means to their mouths. The lymphoid structures bear the brunt of the attack; the bronchial and mediastinal lymph nodes are usually involved and owing to the tendency to latency many cases escape early recognition. Such cases, without cough and without expectoration, show progressive malnutrition and marasmus until the breaking up and dissemination of a glandular focus carries the infection to lungs, meninges, and peritoneum, at which time the clinical signs become unmistakable.

According to the experience of C. von Pirquet in the first year of life the bronchogeneous infection with tuberculosis is by far the most frequent way of entry (about 95 per cent of all infections). The enterogeneous

infection is not important—at least not in Austria (1 per cent to 2 per cent of all infections). A placentogeneous infection of the fetus is a rarity, as is also stomatogeneous and dermatogeneous infections. Prophylaxis of infant tuberculosis has chiefly to deal with the separation of the nursling from the coughing adults.

Occurrence of Pulmonary Tuberculosis in the Children of Tuberculous Parents.—Dr. James Alexander Miller, of New York, has reported on one hundred and fifty children whose parents were under treatment for tuberculosis at the Bellevue Hospital tuberculosis clinic, and who were carefully examined, and form the basis of this report.

Few of these children were brought by their parents because they seemed ill, and very few had symptoms which were marked enough to attract the attention of their parents. The examinations were made as a routine procedure to find out how many children living in close contact with parents who had advanced tuberculosis would be found to have evidence of disease themselves. Their ages varied from two to fifteen years, with an average age of eight and one-half years.

It was found that a positive diagnosis of tuberculosis could be made in 76 children, or 51 per cent of all examined; 43 children, or 29 per cent, were considered not tuberculous; and in 31 children, or 20 per cent, the diagnosis was doubtful. It would thus appear from this limited number of cases that approximately one-half of the children of tuberculous parents, living in the tenements at least, probably have tuberculosis themselves. It was found, however, that the diagnosis was difficult and the evidence of disease slight; and it seemed probable that in the majority of cases with ordinary care the disease would become cured or else would be held in check to break out perhaps in later life. The results are significant in suggesting the possibility of infection during childhood being the cause of many cases of pulmonary tuberculosis. The tuberculin tests were used extensively and were found to be reliable.

Scrofulous Children.—The relation of so-called "scrofula" to tuberculosis is still a mooted question. Newer investigations appear to confirm the view that scrofula is a condition of faulty nutrition owing to which the system is ready for divers infections, as shown by a swelling of lymph nodes adjacent to any portal of entrance. The scrofulous individual is particularly prone to contract tuberculosis and is therefore in greater danger to become infected than the individual not encumbered with the scrofulous diathesis.

Classification of Tuberculous Patients

Frick discusses the various classifications of tuberculosis that have been suggested, including that adopted by the National Association for

the Study and Prevention of Tuberculosis, and suggests the following classification:

INCIPIENT

1. Infiltration limited to one or both apices or a small part of one lobe.
   (*a*) With slight constitutional symptoms, such as malaise, variations of temperature or acceleration of pulse.
   (*b*) Without marked constitutional symptoms, such as gastric and intestinal disturbances, high fever—101° to 103° F.—or rapid loss in weight.
   (*c*) Without tuberculous complications.
   (*d*) Without noticeable impairment of function.
   (*e*) With or without expectoration of tubercle bacilli.

MODERATELY ADVANCED

2. Infiltration involving more than the apices or a small part of one lobe up to two lobes.
3. Consolidation limited to one or both apices or to a small part of one lobe with or without infiltration up to two half lobes.
4. Disseminated fibroid deposits with evidence of active process.
   (*f*) Without cavity formation.
   (*g*) With marked constitutional symptoms.
   (*h*) Without serious tuberculous complications.
   (*i*) Without marked impairment of function.

FAR ADVANCED

5. Consolidation or infiltration involving more than 2 or 3.
6. Extensive fibroid process with evidence of active process.
   (*j*) With or without cavity formation.
   (*k*) With marked constitutional symptoms.
   (*l*) With or without serious tuberculous complication.
   (*m*) With or without marked impairment of function.

Mortality in Tuberculosis

Tuberculosis is the most frequent cause of death in Europe and the United States—every sixth to seventh death being due to this disease in some form. In the United States the mortality is estimated to be 200,000 annually. The greatest number of deaths is due to the pulmonary form of the disease.

It is claimed that the mortality from tuberculosis was much higher formerly but has decreased in the cities of Europe and the United States

by reason of preventive measures and rational methods of management.

The estimation of morbidity and mortality in tuberculosis is, however, extremely difficult. Tuberculosis mortality as well as general mortality has diminished, but it is not proven that the diminution of the former has been greater than the diminution of the latter.

Frequency of Tuberculosis at Autopsies

Beitzke [1] has carefully examined 1,100 bodies—397 of them belonging to children under fifteen years of age and 703 to adults—for signs of active, latent, or cured tuberculous infection. Of the children 13.6 per cent proved to be tuberculous; if infants under one week—all of whom were free from infection—are excluded, 27.3 per cent of the others showed signs of the disease.

The percentage of tuberculous children under one year is quite small; it increases with the increase in age, and between six and fifteen years almost two-thirds of the children proved to be affected. On the other hand, the mortality from tuberculosis among children diminished with age, the lesions in the older ones being mostly of local character and but rarely the cause of death. Of adults, 58.2 per cent proved to be tuberculous, the greatest number falling between the ages of sixteen and thirty.

Of all the bodies, with the exception of infants under seven days, 51.4 per cent proved to be tuberculous, 16.9 per cent dying of the infection. While these figures are very high, yet they do not justify the statement of Naegeli that every adult is or was tuberculous. One might say correctly, however, that of the bodies reaching the autopsy table in a large city the great majority show signs of tuberculous infection. Comparison with earlier figures shows that the mortality from tuberculosis in such cities as Berlin has greatly diminished in the last ten years. So far as the general population is concerned, it remains true, however, that about one-half of all men show signs of tuberculous disease at some time of their lives.

Prognosis in Tuberculosis

Lawrence F. Flick, M. D., of Philadelphia, emphasizes that prognosis in tuberculosis depends: (*a*) upon the virulence of the tubercle bacillus; (*b*) on the dose; (*c*) on the resistance of the host; (*d*) on the coexistence of other microörganisms; (*e*) on the amount of tissue that has been destroyed; (*f*) on the duration of the disease; (*g*) on complications arising from toxemias; (*h*) on age; (*i*) on race; (*j*) on social condition; (*k*) on environment; (*l*) on financial resources; (*m*) on temperament; and (*n*) on character.

[1] *Berl. klin. Wchnschr.*, March 1 and 8, 1909.

Tuberculosis may be prevented, arrested and in some cases lastingly cured. A tuberculous process or focus may heal and diseased tissue may be changed or replaced by connective tissue.

Preventive and Anti-Tuberculosis Measures

"To combat consumption as a disease of the masses successfully requires the combined action of a wise government, well trained physicians and an intelligent people" (S. Adolph Knopf, M. D.). To which may be added that it requires the unity of all civilized races in the fight against tuberculosis.

The Principles Involving the Prevention of Tuberculosis

Tuberculosis in adults is a development of latent tuberculosis in infants and children. The healthy human body is able to arrest and destroy the invading parasite, the Bacillus tuberculosis, whether human or bovine. With a lowering of vital resistance the bacillus finds a foothold; deterioration of the tissues ensues and the spread of the disease is favored. A localized tuberculosis may remain localized or it may spread and invade other parts of the body or the entire system. In this respect it differs from syphilis which invariably gives early systemic manifestations following a primary lesion.

Prenatal Prophylaxis.—Predisposition inherited from a tuberculous parent is difficult to define. We look upon it as a general enfeebled condition without a distinct pathological or demonstrable lesion. To overcome this so-called predisposition we must begin with the child *in utero*. A prospective mother who fears or faces the transmission of tuberculosis to her offspring should be enabled to live in proper hygienic surroundings, breathing good air day and night, and eating good nourishing food sufficient for her requirements. Restricting garments should not be worn and breathing exercises should be practiced. A pregnant mother should not be permitted to work in a factory or workshop.

Protection of Infants and Children.—The newly born child is as much in need of pure air as the grown-up person, and while in early infant life the system requires more warmth, the air the child is to breathe must be pure, free from dust and other impurities. The lying-in room and nursery should be well ventilated and the temperature well regulated.

Artificial Immunization of the Newborn.—Artificial immunization of the newborn by means of vaccines, toxins and bacteria is the one great hope in our fight against tuberculosis. A decided advance has been made in the immunization of animals against tuberculosis, while in man the question

of both toxin and bacterial immunization is still *sub judice,* we must continue to rely upon the natural forces of the body.

Nursing and Environment.—In view of the great susceptibility to tuberculosis in early life radical precautions should be taken to safeguard infants and children. An infant must not take its nourishment from the breast of a tuberculous mother; it should be removed from its dangerous environment and placed where it can get good air, sunshine and good food (tuberculosis preventoria for infants and children).

The following report taken from the Bulletin of the New York Health Board illustrates the danger of a tuberculous environment. Through a combination of favorable circumstances, Dr. Alfred Hess was recently able to study this question in the case of some children left for six weeks in the charge of an attendant who was suffering from tuberculosis of the lungs.

Thanks to the skin test devised by von Pirquet, we now have a simple means of determining the presence of tuberculous infection, and in many institutions for children routine skin tests are now made on all children admitted.

The children studied by Dr. Hess were part of the population of a large infant asylum in this city, where for some time past routine skin tests were made on all children every six months. The results were found to be remarkably constant—a negative reaction on admission meaning almost always a negative reaction later on. In the case of the children studied by Dr. Hess, seven out of ten were free from tuberculosis (as shown by the von Pirquet test) prior to their being in charge of the tuberculous attendant. Three months later all of the children gave a positive reaction, and since all other sources of infection could be excluded, there was no doubt of the rôle played by the tuberculous attendant.

The Hardening of Children.—In regard to the hardening of children, it should be accomplished with due regard to the age and condition of the individual. For the first two years of life the open air method of hardening is the more important. Cool sponging may be practiced in the case of children above the age of three; showers and douches of low temperature are adopted for older children. Deep breathing and other exercises should be encouraged in children not inclined to romp and exercise.

Meat and Milk.—The transmission of tuberculosis through milk and meat of animals can be prevented by boiling or cooking.

Car Sanitation.—The following information regarding car sanitation may be of interest.

The statistics gathered at the last census, as reported by Dr. George M. Sternberg in his book, "Infection and Immunity," showed that railroad men were less affected by tuberculosis than the average of persons of the whole country. Furthermore, information from the Pullman Company did not show that the colored porters were supposed to be predisposed to tuberculosis, in spite of the fact that they spend a large portion of their

lives on sleeping cars. Also the records of the Pennsylvania Railroad, in connection with its Relief Department, showed that passenger conductors and brakemen were not as infrequently affected with tuberculosis as were the freight conductors and brakemen. Again, bacteriological examinations of the air from cars known to have transported tuberculous patients—the results of which have been recently published by Dr. J. J. Kinyoun—did not indicate any alarming prevalence of tubercle bacilli in these cars. Finally, experiments made for the purpose, as to the behavior of tuberculous sputum on carpets and plush, showed that analogous material was less likely to become dry and to be pulverized and disseminated in the air than if this material was on a hard, non-absorbent surface.

Removal of Tuberculous Foci.—The removal of a localized tuberculous focus should be considered, provided it can be done without disseminating disease germs.

Cremation.—Cremation of the dead should be urged.

Destruction of Sputum and Personal Prophylaxis.—The most important prophylactic measure is the destruction of the sputum. In public places, as well as in private sanatoria, white enameled or porcelain spittoons shall be provided, half filled with a lysol or mercuric bichlorid solution. Such spittoons must be disinfected by immersion in boiling water. Patients must be instructed to use a spittoon bottle which can be readily disinfected by hot soda solution or destroyed. An ordinary match box is the most practical spittoon.

Paper napkins should take the place of handkerchiefs. The rubber "comforter" frequently seen in the mouth of infants is dangerous. Utensils used by patients in eating and drinking should be disinfected by immersion in boiling soda water. Beard and mustache should be removed and kissing interdicted.

In living apartments clothes and linen of consumptives should be disinfected. Patients with "open tuberculosis" must be isolated and should sleep alone.

Disinfection.—Formaldehyd and steam are most used for disinfecting purposes. Dr. H. Trautmann of the Hamburg Hygienic Institute advocates book disinfection.

Public Anti-Tuberculosis Measures

Bureaus of information should be established where the tuberculous may obtain full advice regarding hygienic management of their disease and the therapeutic resources of the neighborhood in which they may be compelled to live.

Other general measures are as follows:

1. Voluntary and compulsory notification.
2. Removal of affected children from school and home.
3. Treatment of children in special children's sanatoria.

4. Education of the general public with regard to the disease.
5. Provision of municipal dispensaries in every community.
6. Provision of sanatoria for the cure of early cases.
7. Institutions for advanced cases.
8. Home training and supervision among the working classes.
9. Rigorous supervision of the milk supply.
10. Extermination of tuberculosis among cattle.
11. Assistance to family in the absence of the breadwinner.
12. Provision of suitable employment for cured cases and those in whom the disease is arrested; also the danger of alcoholism and syphilis as predisposing factors should be pointed out.

The "Journal of the American Medical Association," March 14, 1914, Enumerates the Following Measures that Will Cause Further Decrease in this Disease

1. General instruction in hygiene and in the conditions that predispose to this disease.
2. Tenement house laws to prevent overcrowding.
3. Sunlight.
4. Open windows, verandas and roof gardens.
5. Municipal breathing spaces; parks, playgrounds, etc.
6. Proper ventilation of all churches, theaters, halls and assembly rooms.
7. Open-air schools, or open-window schools.
8. Laws prohibiting spitting on the streets and in buildings.
9. Better factory sanitation; better methods of cleaning public buildings and public conveyances.
10. Special laws against the dissemination of dust in factories, foundries and all occupations in which it may be inhaled.
11. Better hygiene and improved buildings for all general hospitals, prisons and jails.
12. Better laws for the more scientific control of tuberculous cattle, and compulsory cleaning and improving of all cow barns and farms used for producing public milk supplies.
13. Certification or pasteurization of all milk used for infant-feeding.

Personal preventive measures are:

1. Compulsory report of every case of tuberculosis.
2. Careful instruction of the family in the care of the tuberculous person, if he is to remain at home.
3. Careful personal instruction of the patient, if he is at an age to receive it, as to the possible methods of communicating the disease to others.

4. Sanatoria for incipient cases of pulmonary tuberculosis.

5. Isolation hospitals for advanced tuberculosis patients whose home surroundings are inadequate.

6. Skilled dispensary care of ambulatory cases and visiting nurses for "follow-up" work.

7. Sanatoria or rest hospitals for joint and bone tuberculosis; these are of special value when located at the seaside. (The value in glandular tuberculosis of seaside sanatoria or veranda rest cures should be recognized.)

Tuberculosis and Marriage

It is claimed by some that tuberculous parents transmit immunity to their children. As a rule this is not the case and a tuberculous mother will have among her offspring some who are predisposed to early infection. Some persons marry without knowing that they are infected and some marry with a full knowledge of their affliction, or in the belief that they have been cured. As a rule, the physician is justified in placing a ban on marriage of the tuberculous, particularly if the individual has not responded favorably to hygienic management extending over a period of not less than two years. In the event of marriage of a tuberculous person the question of adopting preventive measures as regards the procreation of predisposed offspring must be decided on its merits in each particular instance.

The early induction of therapeutic abortion in the interest of a tuberculous mother whose life may be endangered by the strain of pregnancy is justified by the accumulated experience of thoughtful physicians all the world over. *Artificial sterilization* is a legitimate operation provided the woman is informed and accepts the impossibility of ever having issue, in the event of a complete cure of the tuberculosis. A tuberculous woman has the right to motherhood with the understanding that her child is entitled to a tuberculous-free environment.

The Principles Underlying the Treatment of Tuberculosis

The first principle of treatment in tuberculosis is *early diagnosis.* The first requisite for rational treatment is to secure for the patient the best hygienic and dietetic regimen possible, with the hope of reëstablishing the bodily defenses and preventing further tissue degeneration—by reason of which the invading parasite finds a foothold and continues to spread. To stimulate and regulate the production of antibodies in an infected system we employ a judicious combination of rest, exercise and hydro-

therapy (natural and auto-immunity). To add to the defensive powers of an infected body we introduce antibodies from without, tuberculins and vaccines (artificial immunity).

We make use of chemotherapy (drugs) with the expectation of changing the soil to make it unfit for the spread of an infection.

We give symptomatic treatment for controlling alarming or distressing symptoms arising in the course of an incipient or mixed infection, or to relieve the suffering of hopeless cases.

We remove surgically such dead tissue as may be a source of irritation and dissemination.

We suggest hygienic, dietetic, hydrotherapeutic, climatic and occupational measures to prevent relapse, exacerbation or re-infection.

Early Diagnosis the First Principle of Treatment

Pulmonary tuberculosis is rarely recognized at an early and proper time for successful treatment. At a very early stage lung signs are usually not in evidence and an involvement of the peribronchial or mediastinal lymph nodes is difficult to determine. Loss of weight, indigestion, pallor, lassitude, irregular chest pains, and an occasional rise of temperature are the early symptoms.

When a patient presents himself with a "cold" which is hanging on, and complains of being "run down," and has a slight pain on deep inspiration, and if we find on examination dry crepitation anywhere over the apex lobe of the lung, or sibilant râles, or a transmitted whisper, we may suspect tuberculosis even in the absence of bacilli in the sputum. An initial hemorrhage with fever and loss of weight is pronounced evidence of pulmonary infection.

Incipient Cases Show: Slight initial lesions in the form of infiltration limited to the apex or small part of one lobe.

No tuberculous complications. Slight or no constitutional symptoms (particularly including gastric or intestinal disturbances or rapid loss of weight).

Slight or no elevation of temperature or acceleration of pulse at any time during twenty-four hours, especially after rest.

Expectoration usually small in amount or absent.

Tubercle bacilli may be present or absent.

With all the symptoms of early tuberculosis the finding of slight signs does not actually prove the existence of the disease. Further observation of the patient's temperature, pulse, weight and other clinical symptoms, and repeated observations undertaken, preferably at different times of the day, with more than one careful sputum examination, are demanded. After all this the diagnosis may still remain in doubt, and it is in this group of cases that tuberculin renders an invaluable service.

Administration of Tuberculin.—Its administration is practically without danger to the patient and only in rare or very far advanced cases is the specific reaction absent. Tuberculin is used subcutaneously for diagnostic purposes, in one-half to one milligram doses in apyretic cases. If no reaction follows an increased amount can be injected a week later. A third injection may be given after another interval if necessary.

The patient should, of course, be at rest the day previous to the administrations of tuberculin, and the temperature carefully recorded, and he should remain in bed until the reaction has passed off—an interval of one to two days.

Fig. 70.—Fresh Air Treatment on Roof.

Contra-indications to the Subcutaneous Test.—These are: certainty of diagnosis, fever, recent hemoptysis, advanced heart or renal disease, epilepsy, diabetes and convalescence from a severe infection. The von Pirquet scratch test is described in Section I.

X-ray Examinations.—An x-ray examination has been found to be very helpful in locating a tuberculous focus.

Von Pirquet Test.—This scratch test is very valuable in the case of infants and young children. When tuberculosis is strongly suspected and the test is negative a second test should be made. If this is also negative it is safe to assume that the suspect is free.

Non-tuberculous Hemoptysis.—Various non-tuberculous lesions may be responsible for hemoptysis:

Varices at base of tongue or in the pharynx.

Vicarious menstruation.

Congenital or acquired hemorrhagic diathesis.

Chronic hemorrhagic catarrh of larynx or trachea.

Hemorrhagic manifestations accompanying chronic nephritis, hepatitis, diabetes or various acute infections.

Hemorrhages in hysterical or designing subjects.

Latent and Attenuated Pulmonary Tuberculosis.—Latent tuberculosis, extremely frequent, consists in pleural adhesions, apical scars, or chronic pneumonia. Some of these cases remain latent indefinitely and have no clinical history, others represent the first stage of evolution of the disease which does not appear until long after the onset of the infection, as the result of an overexertion, a traumatism, or an infectious disease. These

latent forms of tuberculosis manifest themselves especially by changes in the breath sounds at the pulmonary apices, the general state of health remaining fairly good, and by occasional hemoptyses.

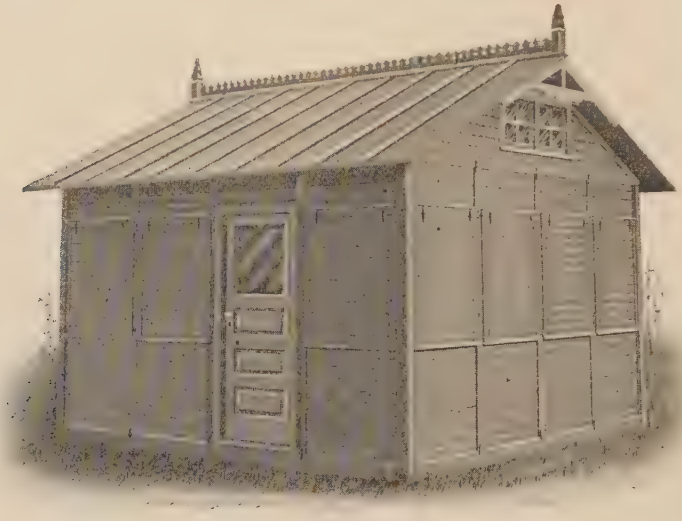


FIG. 71.—PORTABLE OPEN AIR COTTAGE CLOSED. Saginaw, Michigan. (Courtesy of Saginaw Co.)

Non-tuberculous Apex Catarrh.—An apical inflammatory process may simulate tuberculosis. With an infarct in the apex, the sudden onset of

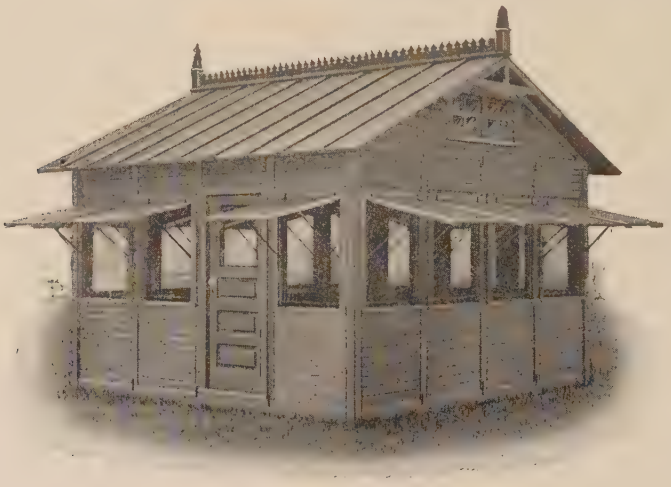


FIG. 72.—PORTABLE OPEN AIR COTTAGE, Saginaw, Michigan. (Courtesy of Saginaw Co.)

pulmonary symptoms in heart disease point to the correct differentiation; pleurisy may follow if the infarct reaches to the surface. The trouble

may be a tumor; there is dullness over a tumor while respiration does not seem to be totally arrested. Echinococcus disease may simulate a tuberculous process, but it can be differentiated by a puncture fluid free from albumin but with large salt content.

An unresolved pneumonia is not rare in children. Its significance should be ascertained by the von Pirquet test, Wassermann test and by a röntgenogram. In adults the sputum which is negative for tuberculosis should be examined for fungi.

Complement-fixation Test.—Complement-fixation test with an antigen may be employed in obscure cases. Its value in tuberculosis appears almost that of the Wassermann test in syphilis.

Climate in Tuberculosis

Outdoor Life at Home.—The main factor in the individual fight against tuberculosis is the outdoor life in fresh air and sunshine, tubercu-

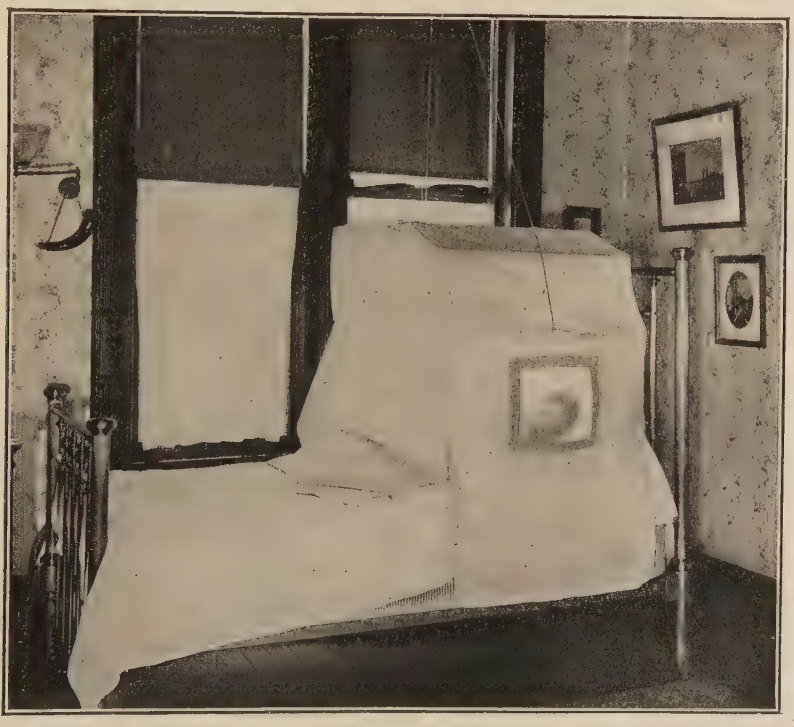


FIG. 73.—DR. S. A. KNOPF'S WINDOW TENT. (After Billings, "Therapeusis of Internal Diseases.")

losis being the natural consequence of faulty habits and a departure from natural conditions.

Outdoor life at home can best be accomplished as illustrated by means

of a tent, window tent, sleeping porch, or shack or portable house with comparatively little expense.

Principles on Which to Base Climatic Suggestions.—Tuberculosis develops in all climates. Recoveries are made in all climates and it can be treated successfully anywhere. While no climate is specific, many climates are useful. The contradictions of phthisiotherapeutists regarding an ideal climate probably spring from attempts at generalization. There is probably an ideal climate for each type or race, that to which it is physically adjusted. Many individuals respond favorably to climatic change from seashore to mountain and vice versa. The only way to determine the possibility of favorable action of a given climate is by actual trial; however, there are certain principles on which to base climatic suggestions:

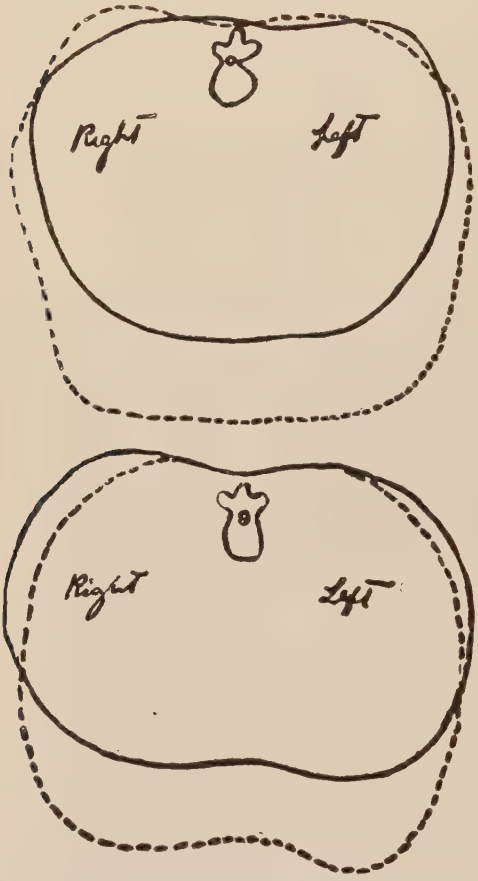


FIG. 74.—DIAGRAMS SHOWING INCREASED CHEST GIRTH AFTER SOJOURN IN HIGH ALTITUDES; THE SOLID LINES SHOW GIRTH BEFORE AND DOTTED LINES GIRTHS AFTER STAY IN HIGH ALTITUDE. (After Theodore Williams.)

Copious expectoration is best managed in a dry atmosphere at about 4,000 feet altitude.

Early and moderately advanced cases in young and middle aged persons do well in a cold climate at an altitude of about 1,000 feet.

Elderly people do well at a moderate elevation in a mild temperature.

Laryngeal cases are more comfortable in a mild moderately moist air.

Tuberculous children and joint and bone affections do better in coastal climates.

Patients whose disease is complicated by albuminuria or nephritis are more comfortable in a mild climate with no elevation.

The author has observed surprisingly good results from long sea voyages (from New York to Australia and back in a sailing vessel).

High Altitude and Blood Pressure.—Consumptives have a lowered

blood pressure of about 100 mm. mercury. Continued residence in high altitudes is apt to raise blood pressure and increase the girth of the chest—as shown by the diagrams on opposite page.

In most instances our selection is made with due regard to the convenience of the patient; also the season of the year must receive thorough consideration as well as such matters as dry soil, sunshine, moderate humidity, protection from high winds, pure air and altitude, psychic, social and financial status of the patient, diversions, and associations.

An invalid in an advanced stage, or a moral weakling, should not be encouraged to travel. They are best off at home or in a sanatorium.

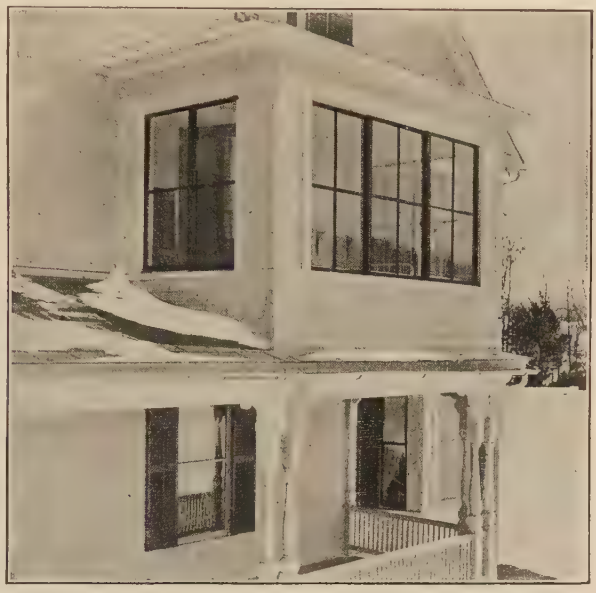


FIG. 75.—SLEEPING BALCONY. (Private house, Saranac Lake, N. Y.) (After Klebs, "Treatise on Tuberculosis.")

Suggestions to Travelers.—For the guidance of those who are willing and able to travel the following suggestions are offered:

MARINE—MILD	DRY CLIMATE—LOW AND HIGH ELEVATION	MODERATE ALTITUDE — DRYNESS AND WIDE TEMPERATE RANGE
Madeira	Egypt	Adirondacks, N. Y.
Canary Islands	Arizona	Catskill Mountains, N. Y.
Santa Barbara	Southern California	Sullivan County, N. Y.
West Indies	Colorado	Wyoming
Florida	British Columbia Rockies	North Carolina
Georgia	Tyrol	Mexico
Riviera	Mediterranean Basin	Black Forest, Germany
Sea voyages in temperate zone	New Mexico, Fort Bayard	Taunus, Germany

The Advantages of Sanatorium Treatment

Apart from the climatic advantages incident to the favorable location of a tuberculosis sanatorium, the patient profits by the rigid sanitary drill in a well-appointed institution. He is, moreover, under constant super-

vision and surveillance and remedial measures can be applied without loss of time, as soon as the symptoms warrant them. Also specific and hydrotherapeutic treatment can be best carried out in an institution.

A climatic resort should be regarded as a university, teaching discipline and instruction, which the patient can bring back home, and continue to apply to his own daily living.

For well-to-do and rich patients sanatoria are available in all parts of the civilized world. For the poor, states and towns, life insurance com-

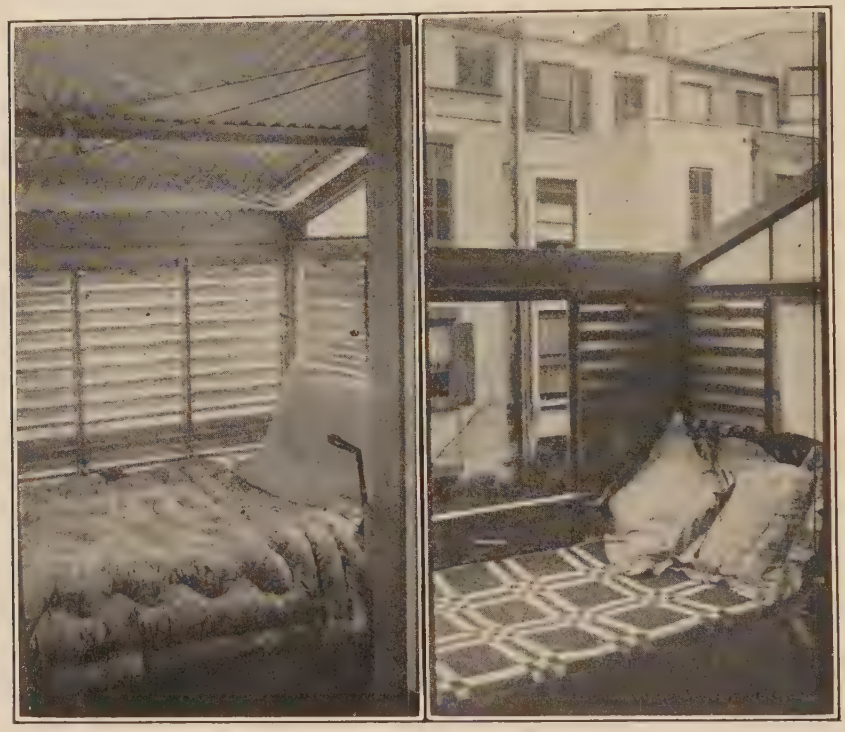


FIG. 76.—OUT-DOOR SLEEPING QUARTERS. (Courtesy of Dr. A. Knopf, New York.)

panies, and benevolent societies are active in providing sanatorium treatment.

Not all sanatoria are efficient in reducing the spread of tuberculosis because they do not isolate their "open" cases. It is dangerous to come in contact or live with a careless consumptive. Many are permitted to mingle with the general population and thus the opportunity is given to infect others—particularly children.

The hygienic drill—extramural—which the patients are compelled to accept in a well-conducted sanatorium becomes a fleeting virtue, for in most instances the sanitary drill cannot be kept up after the improved patient returns home on account of the lack of proper facilities.

Sanatoria and Farm Colonies.—One of the mistakes in handling tuberculosis in sanatoria lies in the fact that in sanatoria the patients lead a life of idleness which is harmful in many cases, and on return to their homes "soft and fat," the least fatigue on taking up work is apt to be harmful.

The farm colony system—the ideal theoretical method today—will under these circumstances be thoroughly practical, and the cure of tuberculosis will then become such a factor as to be of value equal to what prevention might be today, if carefully regulated by law.

In a farm colony many pleasant forms of occupation can be devised and offered, both intellectual and physical, and more attention can be paid to the matter of providing suitable employment for patients, so that they shall not become demoralized by prolonged idleness.

The farm colony system can be continued with a tent sanatorium. Attractive memorial cottages and expensive buildings take away the money which could be better invested in a tent colony and confer greater blessings on greater numbers.

Tents are constructed with tight boarded flooring and wall, the latter being about three feet high. The tent above will raise the domicile to seven or eight feet in height. Over all is a duck fly projecting over the door of the tent and forming a porch. Such a tent can be heated by means of a small stove.

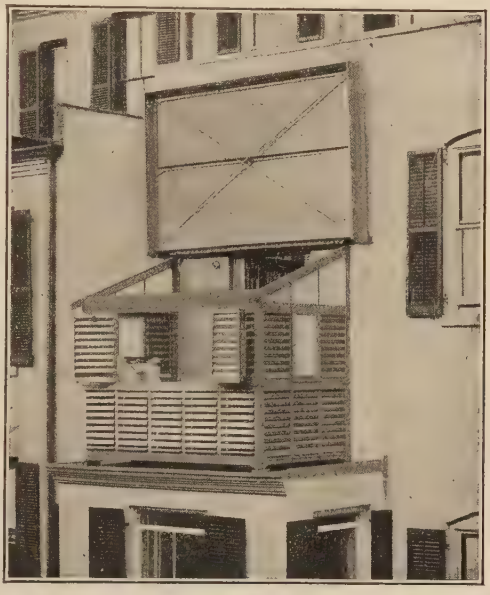


FIG. 77.—DR. S. A. KNOPF'S "STAR NOOK," AN OUTSIDE SLEEPING CAGE PROTECTED FROM VIEW BY FIXED LOUVERS, ADAPTED TO CITY CONDITIONS. (After Billings-Forchheimer. "Therapeusis of Internal Diseases.")

Municipal Tuberculosis Dispensaries

Tuberculous patients and invalid employees presenting themselves for treatment in hospitals, infirmaries, and charitable institutions, generally should be directed to the tuberculosis dispensary, which should be the uniting point or clearing house of all other agencies. The public should be made aware that the dispensary is prepared to answer all inquiries regarding tuberculosis and advise what is best to be done in a given case. An officer living in the place can attend to all inquiries coming after dis-

pensary hours. A staff of physicians should be in attendance daily during stated hours and a nurse and social visitor should be available to visit the homes of the patients. Ambulatory treatment should be offered to the proper class of patients. Selected patients should be advised to enter a sanatorium and should subsequently be referred to a farm colony for supervision and training in open-air employment.

Dying patients should be referred to the proper hospital or asylum, chiefly in the interest of other persons. If properly managed a tuberculosis dispensary is a preventive institution of great importance to the community.

The National Association for the Study and Prevention of Tuberculosis publishes a directory of institutions for tuberculosis in the United States and Canada, and its official organ, *The Journal of the Outdoor Life,* 2 Rector Street, New York, courteously states that its service department "will furnish, without charge, information about sanatoria, boarding houses, health resorts, and such other data as it has on file."

Hydrotherapy in Tuberculosis

Hydrotherapy must not be understood as a method of reducing temperature; it should be classed as one of our best tonics.

We have in water a remedy with which we can produce a variety of effects according to the force, mechanical impact and temperature applied. Cold rubs, wet packs, half baths, sheet baths, pressure sprays, etc., all have their indications.

Tuberculous patients should be advised to bathe regularly in warm water and to follow each bath with an alcohol rub. In warm weather a cold sponge bath is beneficial. Cold water is not injurious to patients who are accustomed to it. Wet packs are useful in profuse night sweating. Permanent baths in which the patient remains in the water for hours at a time protected from drafts give good results, according to the writer's experience, in acute as well as in chronic infections.

The value of the internal use of water is not sufficiently appreciated. By taking from six to eight glasses of water during the day the toxins are diluted and the sputum is less tenacious.

Respiratory and Other Active and Passive Exercises in the Prevention and Treatment of Tuberculosis

Deep breathing exercises are valuable for everyone, and particularly for flat-chested individuals and those predisposed to consumption. Under ordinary conditions we inhale and exhale about 500 c.c. of air at each breath. In deep breathing the intake and output of air is about 1,500 c.c. and there is a corresponding increased metabolism. Breathing exercises may be started in children at an early age in the open air or in front of

Fig. 78.

Fig. 79.

Fig. 80.

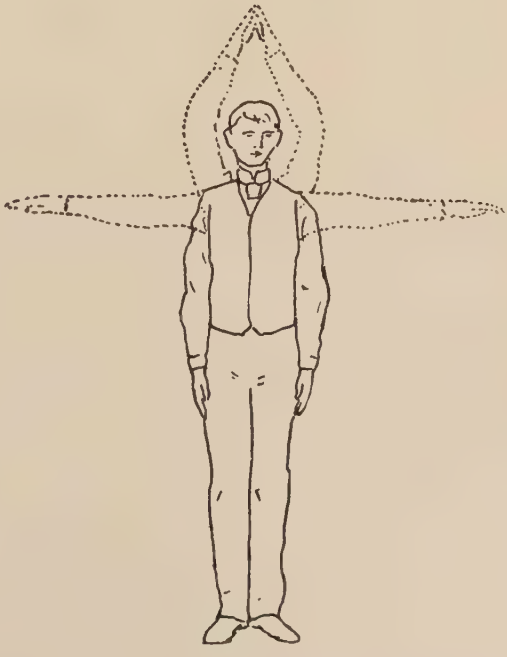


Fig. 81.

Figs. 78-81.—Chest Expansion Exercises. (Courtesy of Dr. A. H. Knopf, New York.)

an open window. Mouth breathing in children and adults usually requires surgical treatment, if due to adenoids or enlarged tonsils.

Breathing exercises for *consumptives* are also advisable, but with certain *limitations.* Hemorrhage, fever, active pleurisy and periods of exhaustion are contra-indications for any form of active exercise. Convalescent consumptives may profit by bed calisthenics and passive motions or automassage in bed with the windows open. Half an hour's work, extending over the working period of the day, will not tire the patient. Passive motion, massage and vibration can be given in or out of bed. Walking is the best form of outdoor exercise.

Clothing

Experience teaches that patients are prone to follow their own notions of dress, irrespective of the advice of the physician. According to the author's idea invalids' underwear, whether wool, cotton or linen mesh, should be thin and light. Heavy and comfortable *outer garments* are to be relied upon as a protection in low temperature. Stockings, on the contrary, ought to be of heavy wool in cold weather, especially for invalids who complain always of cold feet.

For outdoor sleeping a capote or sleeping helmet is a necessity, also bed socks and warm pajamas. In extreme weather conditions, a loose sweater should be worn.

Diet in Tuberculosis

There is no special diet for tuberculous patients. The food must be well prepared and, for the average patient, three thousand calories—of which ten per cent should be in the form of protein—are sufficient for the daily needs.

There is a strong tendency at the present time to advise against an excessive meat and protein diet in tuberculosis, and to substitute vegetable protein for flesh protein. During the acute phase of tuberculosis, the patient, if left to his own desire, will not overeat because of loss of appetite and gastric disturbances.

A suitable diet for a consumptive without fever does not differ in quality or quantity from a suitable diet for the same person in health. All kinds of meat, fish, and sea food may be allowed, and all cereals—not forgetting rice; also all vegetables, excepting beans and lentils, on account of their tendency to produce flatulence.

Milk and eggs in liberal quantities are called for, also raw, stewed or preserved fruit. Cream and sweet or salt butter will give all the fat that is necessary and will take the place of nauseating oils or oil emulsions.

Cheese and rice have a high nutritive value. Sugar in moderate quantities is good nourishment. All kinds of salads are in order. Coffee, tea, cocoa, and chocolate may be indulged in, and alcohol in the shape of light wines, or whisky in moderation is permitted.

Natural craving is the best guide for feeding in the vast majority of cases in adults. Children are fed according to age and condition.

Patients with fever need a "fever diet" and should not be fed by the clock, but principally at a time when the fever is low, and when there is craving for food and no nausea.

Consumptives with diarrhea may need a special diet for a time. (*See* Diarrhea.) Cool aërated or distilled waters may be given ad libitum. Smoking is not advisable.

Care of the Alimentary Tract

The teeth must be kept in good repair and, after eating, a toothbrush should be used for three minutes by the watch, this to be followed by a mild antiseptic gargle. One good bowel movement daily must be achieved. Five drops of dilute muriatic acid in water after meals will aid digestion.

Care of the Nasopharynx

Mouth breathing must be overcome—surgically if necessary. A teaspoonful of salt water should be instilled into each nostril at least twice a day, and before going to sleep benzoinated albolene should be sprayed into each nostril. (*See* Nasopharyngeal Toilet, Section I.)

Induction of an Artificial Immunity in Tuberculosis

Whenever natural inborn immunity is lacking, the induction of artificial immunity by means of *tuberculin, vaccine* or *serum,* and, if possible, under guidance of the opsonic index, is a rational procedure. Behring has announced a new remedy under the name of *tuluse,* the value of which is not as yet established.

The therapeutic use of living so-called avirulent tubercle bacilli is in the experimental stage.[1] All immunizing remedies should be used in connection with hygienic and dietetic management.

Specific treatment gives best results in the initial stage of tuberculosis in cases with or without active hemorrhage and before mixed infection is evidenced by constant irregular fever.

Contra-indications for Specific Treatment

These are mixed infections with constant high fever, cardiac insufficiency, complications with nephritis, diabetes and chronic nervous ailments, and miliary tuberculosis.

[1] See "Immunization against Tuberculosis," by Drs. Carl and Silvio Von Ruck, Asheville, N. C.

Specific Preparations

Tuberculin.—Old tuberculin (Koch) contains the soluble product of the tubercle bacillus in 50 per cent glycerin solution.

Sterile solutions in glass ampules are now on the market or may be prepared by the pharmacist or physician as follows:

Mode of Dilution.—Dilute crude old tuberculin (Koch) with sterile physiological salt solution or with ½% carbolic acid water as follows:

Sol. No. 1	Tuberculin.....1 c.c.	1 c.c. = 0,1
	Diluent .....9 c.c.	
Sol. No. 2	Sol. No. 1 .....1 c.c.	1 c.c. = 0,01
	Diluent .....9 c.c.	
Sol. No. 3	Sol. No. 2 .....1 c.c.	1 c.c. = 0,001
	Diluent .....9 c.c.	
Sol. No. 4	Sol. No. 3 .....1 c.c.	1 c.c. = 0,0001
	Diluent .....9 c.c.	
Sol. No. 5	Sol. No. 4 .....1 c.c.	1 c.c. = 0,00001
	Diluent .....9 c.c.	
Sol. No. 6	Sol. No. 5 .....1 c.c.	1 c.c. = 0,000001
	Diluent .....9 c.c.	
Sol. No. 7	Sol. No. 6 .....1 c.c.	1 c.c. = 0,0000001
	Diluent .....9 c.c.	
Sol. No. 8	Sol. No. 7 .....1 c.c.	1 c.c. = 0,00000001
	Diluent .....9 c.c.	
Sol. No. 9	Sol. No. 8 .....1 c.c.	1 c.c. = 0,000000001
	Diluent .....9 c.c.	

Mode of Procedure.—Nine glass-stoppered bottles of 10 c.c. capacity, one pipet and a flask of sterile diluent are required. Inject after cleansing the skin with alcohol and painting the puncture site (chest, shoulder and abdomen) with tincture of iodin.

The initial dose should be one-millionth of a milligram in nonfebrile cases. In cases with moderate fever give one ten-millionth of a milligram.

Patients must keep their temperature record or have it kept. A dose that causes a slight disturbance (reaction) from which the patient recovers in a day may be repeated but must not be increased. The increasing dose should be about one-third of the preceding dose.

After ten injections have been made in weekly intervals the remedy may be discontinued for weeks or months and resumed according to indications. The more advanced cases will require a prolonged treatment.

Wright's opsonic index as a guide to dosage is unfortunately too intricate for use in general practice. At present careful observation and good judgment are the safest guides for tuberculosis treatment.

Tuberculin-Strychnin Treatment.—It is claimed that strychnin given

subcutaneously in combination with tuberculin enhances the value of the tuberculin treatment.

Bacillus Emulsion (Koch), B. E.—A finely pulverized culture of tubercle bacilli is made into an emulsion with 50 per cent glycerin, which is heated to kill viable bacilli. Each cubic centimeter contains 5 milligrams of the specific (1 c.c. = 0,005).

Mode of Dilution

Sol. No. 1	Tuberculin B. E. 2,0	1 c.c. = 0,001 or one milligram
	Diluent 8,0	
Sol. No. 2	B. E. Sol. No. 1 . . . 1 c.c.	1 c.c. = 0,0001
	Diluent . . . . . 9 c.c.	
Sol. No. 3	B. E. Sol. No. 2 . . . 1 c.c.	1 c.c. = 0,00001
	Diluent . . . . . 9 c.c.	
Sol. No. 4	B. E. Sol. No. 3 . . . 1 c.c.	1 c.c. = 0,000001
	Diluent . . . . . 9 c.c.	
Sol. No. 5	B. E. Sol. No. 4 . . . 1 c.c.	1 c.c. = 0,0000001
	Diluent . . . . . 9 c.c.	

(1 pipet, 5 bottles and a flask of sterile diluent are required.)

Mode of Procedure.—The dose of Bacillus Emulsion and the method of its administration and the indications for using it, are the same as for tuberculin. There are many other preparations of a like nature used in the specific treatment of tuberculosis, but since they present no special advantages in point of efficacy, they are not enumerated.

Serum and Vaccine.—Treatment with vaccines and various kinds of serums has been disappointing so far.

Treatment with Live Bacilli.—This form of treatment, by means of subcutaneous or intravenous injections of avirulent live tubercle bacilli obtained by feeding specific *human* sputum to turtles and reptiles, is in the experimental stage and has little to its credit.

Milk of Immunized Cows in the Treatment of Tuberculosis.—This has been suggested but thus far no proof of its efficacy has been furnished.

Cellular Extract of Red Corpuscles.—In the course of the last few years a good deal of attention has been attracted by the treatment recommended by Carl Spengler under the term *immunizing bodies* or IK (Immun Körper) based on immunization by means of a cellular extract of red corpuscles. This treatment is also in the experimental stage.

Chemotherapy in Tuberculosis

The tubercle bacillus is so inaccessible because of its hiding place in caseous dead tissue, or in non-vascular tubercles, and so resistant to drug or inhalation therapy that most reliance should be placed on the hygienic-

dietetic management already discussed. The suggestion of a "cure" conveyed by drug treatment is not without value, however, for we know that nearly every new method of treating consumption, if it be harmless, gives good results.

Preparations

Creosote.—Clinical experience is somewhat favorable regarding the power of creosote to check to some extent the spread of tuberculosis in the tissues. The dose is from ½ minim to 6 minims 3 times a day in pill form or capsule, or in milk, maltine, etc. In some patients creosote upsets the stomach and creates nausea—in which case its administration should be discontinued.

Guaiacol.—Guaiacol is the active ingredient of creosote and has been used in lung and bone tuberculosis for half a century. Under its use the cough loosens and patients increase in weight. The single dose of guaiacol carbonate is 0,5 (about 8 grains) and as much as 3,0 (45 grains) can be given in one day.

Mercury.—In the *Journal of the American Medical Association,* Nov. 28, 1908, Dr. Barton L. Wright, Surgeon U. S. Navy, reports his experience with hydrargyrum succinimidum as follows:

> One injection of hydrargyrum succinimidum gm. 0,013 (gr. 1/5) is given every day until thirty injections have been given. Then injections are discontinued and potassium iodid gm. 0,2 (gr. 3) to gm. 0,6 (gr. 10) is given, well diluted with water, one-half hour after meals for two weeks. Then potassium iodid is discontinued and no medication is given for one week.
>
> Injections are then resumed as follows: one injection every other day until thirty injections have been given, on alternating injection days, giving hydrargyrum succinimidum, gm. 0,013 (gr. 1/5), and gm. 0,006 (gr. 1/10), respectively. After the thirtieth injection the same course of potassium iodid is given as followed the first series of injections; then a week free from medication. The injections are then resumed, the succinimid gm. 0,006 (gr. 1/10) being given every other day until thirty have been given. By the end of this third series, experience will direct any necessary further treatment.
>
> The above recommendation for dosage is not to be considered absolute, but only a guide. Close observation of each individual patient must fix the dose of the first series of injections.
>
> At times the initial injection will produce a slight febrile reaction, after which the temperature should fall to what it was prior to the injection. Experience has taught us that if this drop does not occur, or if the rise in temperature occurs after the second injection, the dose administered was too large and should be reduced at once.

The drug is injected subcutaneously with a small glass syringe. Tabloids of hydrargyrum succinimidum gr. 1/5 (0,013) are on the market.

Dr. Wright's results and treatment are as follows:

> During the past six months we have not found a single tuberculosis patient whom mercury injured in the least; on the contrary, in over 85 per cent of all

the cases so treated an improvement has taken place, and in most instances this improvement was decidedly marked, not only from the point of general condition, but the diseased pulmonary area was greatly reduced. Nor has this improvement been confined to the diseased lung, for we have cured a number of patients with secondary tuberculous laryngitis, one with secondary tuberculous epididymitis and one with secondary tuberculosis of the kidney and prostate.

The author has not had as yet any personal experience with mercury succinimid in purely non-syphilitic tuberculous cases.

Arsenic.—Arsenic in substance in pill form (gr. 1/20, 0,003, 3 times a day) or in solution (Fowler's) has been employed very often to combat tuberculosis in connection with hygienic and dietetic management. The newer preparations of arsenic, atoxyl and salvarsan or neosalvarsan, have not as yet been tried out.

Intravenous Arsenic-Tuberculin Treatment.—Intravenous injections of a 15 per cent solution of atoxyl (0,05-0,3 at a time) in combination with tuberculin (1 to 1,000 or 1 to 10,000) are recommended by Mendel[1] especially for use in lung sanatoria, in advanced cases in which the ordinary physical methods of treatment prove inadequate. The most desirable arsenic preparation, in his opinion, is atoxyl, which never gives rise to toxic symptoms when used in the above mentioned strength and medium doses, but in the form of intravenous injections displays an eminently curative effect, without any untoward manifestations.

In the majority of cases this method of treatment not only led to an improvement of the general condition, but to a modification of the local pathological process, showing that the power of resistance of the organism against the tuberculous injection is very efficiently increased through this combined method of treatment.

As a substitute for arsenic, *selenium and vanadium* may be employed, inasmuch as they are less toxic than arsenic:

℞ Vanadii pentoxyd.....gr. xxx (2,0)
Ferri saccharat.....ʒiiss (10,0)
Divide in pulv. xxx.
Sig. One powder 3 times a day.

Potassium Selenocyanate.—This may be given in 1/20 grain doses to begin with but not more than half a grain must be given in twenty-four hours.

Treatment Directed Against Demineralization

It is known that workers in chalk and lime are relatively free from tuberculosis; therefore calcium has been suggested and administered by French physicians, with a view of combating the demineralization caused by the tuberculous process.

[1] Mendel, *Münch. med. Wchschrft.*, No. 1, 1909.

℞ Calc. carbonic.....
Calc. phosphat..... āā 3ii (8,0)
Sodii chlorid.....
M. F. chart xxx
Sig. One wafer after each meal.

This treatment may be continued for months.

X-Ray, Radium, Finsen Light, Ionization, Cataphoric Treatment, and High Frequency Currents

These methods of treatment, to be of value, should be practiced in sanatoria in connection with hygienic and dietetic management. The benefits to be obtained thereby are imponderable in ambulatory or office treatment. For detailed information regarding the biological action of various forms of radiation, *see* Kowarschik, "Die Diathermie"; also Nagelschmidt, "Lehrbuch der Diathermie," and "Cataphoric Treatment".[1]

Surgical Therapy in Tuberculosis

Surgical therapy in tuberculosis is not within the scope of this work. The ultra-operative tendency which was dominant twenty-five years ago has given way to more conservative treatment. The prospects of a permanent cure after operation are much smaller for adults than for younger patients. In advanced cases the question of resection or amputation must be settled for each individual case on its merits. The prognosis after operative treatment varies with the joint operated upon. In the knee, elbow and ankle, the results after radical treatment are best; the hip, wrist and shoulder should usually be treated conservatively.

The Clinical Forms of Tuberculosis and Their Management

Acute Pulmonary Tuberculosis

(*Acute Tuberculous Bronchopneumonia—Galloping Consumption*)

Acute pulmonary tuberculosis is met with in children and in adults. In young children this form is frequently mistaken for *simple bronchopneumonia* on account of the difficulty of obtaining sputum for further investigation and on account of the similarity of the physical signs. Some cases present distinct areas of consolidation, in others the inflammatory process is diffuse with impaired resonance but no actual dullness on per-

[1] W. J. Manning, *Med. Times*, Jan., 1914.

cussion. In children this form of tuberculosis frequently follows other infectious diseases—particularly measles and pertussis.

The *symptoms* are severe. There are rapid loss of weight, hectic fever and cyanosis. Death is the usual outcome.

In some cases improvement takes place and the clinical picture merges into that of chronic phthisis. In a few of the author's cases, in young adults, complete recovery took place within six to eight weeks after the onset, but this may be looked upon as an unusual and rare termination.

Prophylactic measures are fully discussed in this chapter under Preventive Measures.

Symptomatic management is given in detail below, under the heading, Chronic Ulcerative Pulmonary Tuberculosis.

Specific and immunizing treatment with tuberculin or bacillary emulsion is no aid to the system in its battle against this form of the disease.

Chronic Ulcerative Pulmonary Tuberculosis

(*Phthisis—Consumption*)

Under this heading may be grouped the majority of cases of chronic ulcerative tuberculosis of the lung, with and without cavity formation and with various modes of onset and divers complications and changes in other organs.

The prophylactic, hygienic and specific management are fully discussed in pages 283 to 296.

Symptomatic Management of Pulmonary Tuberculosis

Fever.—Patients having a temperature of over 100° F. are advised to rest in bed. They should have cold water to drink. Frequent sponging with cool water is to be preferred to the administration of antipyretics. When the fever curve is suggestive of malaria one or two fairly large doses of quinin may be given as a therapeutic test, otherwise quinin has no beneficial effect in tuberculosis and it usually upsets the stomach. If the fever is due to stomach derangement ten drops of dilute hydrochloric acid are to be given in water several times a day. Persistent high fever due to toxemia demands the cool pack and cool, fresh air day and night.

Inunctions of a 10 per cent guaiacol-petrolatum have been found to be effectual in reducing the temperature; a small lump may be rubbed into the skin twice a day. In hopeless cases the patient should not be forced to live out-of-doors in very cold weather if he objects to it.

Night Sweats.—Night sweats, like fever, are a symptom of toxemia. When well directed general management is followed by marked general improvement, night sweats will subside. The following palliative measures will make the patient more comfortable:

(1) Sponging with alcohol and water (equal parts) at bedtime, or vinegar and water (equal parts).

(2) Cold compress around the chest, a glass of cold milk, to which is added a teaspoonful of whisky on retiring or when awake during the night.

(3) Atropia hypodermically administered—gr. 1/200 to 1/100 (0,0003 to 0,0006).

(4) Having the patient rest over night in a coarse linen shirt wrung out in cool water with sufficient blanket covering to avoid chilling.

Cough.—Cough is a reflex phenomenon taking its origin somewhere in the respiratory tract. Its management depends more or less upon the exact location of the region in which the reflex arises. Nasal polypi must be removed if present and occasionally an elongated uvula needs clipping. Pharyngitis (granular or chronic) requires daily cauterization with a five per cent nitrate of silver solution, after which an albolene spray should be sent through the nares to lubricate the nasopharynx.

In laryngeal irritation the inhalation of medicated steam from a croup kettle usually gives relief (table salt—1 dram, water—1 pint, co. tincture of benzoin—1 dram).

Topical applications of 5 per cent argentic nitrate solution or intralaryngeal or intratracheal injections of the "Lake Mixture" may be employed in patients who tolerate such local treatment:

℞ Naphthalin	3,0	gr.	45
Oil cinnamon	0,5	gr.	7½
Oil petrolatum	90,0	oz.	3

Dose. 15 drops every other day.

Absolute rest of the larynx is essential.

Of drugs to check cough, morphin—gr. ⅛ to ¼, and codein—gr. ⅛ to ½, or heroin—gr. 1/12, given at night, are serviceable, or the following mixture may be given:

℞ Acid hydrocyanic dilut	gtt xv	1,0
Potass. bromid	ʒii	8,0
Sol. morph. magendie	ʒi	4,0
Hydrat. chloral	ʒii	8,0
Spir. frumenti	ʒiv	15,0
Syr. aurant. ad	ʒvi	180,0

Sig. Tablespoonful when necessary to check cough.

Before resorting to medication to check cough the patient should be advised to use the nasopharyngeal spray of albolene and endeavor to inhibit a dry cough by *will power.*

Pain in Chest.—Pain in the chest may often be relieved by applying a hot water bag, a mustard plaster, antiphlogistin, dry cups or chloroform liniment. The affected side may be strapped with adhesive plaster. In severe cases of pleural pain, a hypodermic injection of morphin—gr. ⅛ to ¼—is called for.

Insomnia.—A glass of hot milk or a bottle of good beer at bed time are often helpful. Bromural—gr. 10 to 20, veronal—gr. 10 to 15, or trional—gr. 10 to 15, are safe hypnotics; also chloral hydrate—gr. 10 to 20.

Constipation.—Soapsuds enemas are to be preferred to laxative drugs.

Simple Diarrhea.—Diarrhea, not due to intestinal tuberculosis, usually yields to a binding diet (without milk). Tannic acid—gr. 5 to 10, with opium—gr. ½, may be given once or twice a day or the following mixture:

℞	Bismuth subcarb.....	8,0	ʒii
	Tinct. opii.....	4,0	ʒi
	Extr. krameriae fl.....	4,0	ʒi
	Essence of pepsin.....	60,0	ʒii
Sig.	Teaspoonful every 3 hours. Shake well.		

Loss of Appetite.—To stimulate a flagging appetite we administer:

℞	Acid nitromuriatic dil.....	āā 10,0	ʒiiss
	Tinct. nuc. vom.....		
Sig.	15 drops in sugar water one-half hour before eating.		

Alcohol in the shape of a highball, Moselle wine or champagne with angostura bitters may be taken during a meal.

Hemorrhage.—Pulmonary hemorrhage may be the first marked symptom in pulmonary tuberculosis, or it may set in at any time during the progress of the disease. When sudden hemorrhage manifests itself in a person heretofore uncomplaining or in apparent good health, the source and nature of the bleeding must be determined as speedily as possible.

Non-tuberculous Hemorrhage.—Hemorrhage of gastric origin is not frothy and not of a bright red color as we find it in pulmonary hemorrhage. When blood-streaked mucus is expectorated the bleeding may take origin from small varices at the base of the tongue. Galvanocauterization of the bleeding point will effect a cure.

Small hemorrhages may also result from congestion or be caused by inflammation of the pharynx, larynx and trachea occurring in renal, hepatic or in non-tuberculous pulmonary disease, in cardiac disease, in hemophilia, lues, arteriosclerosis, sepsis, vicarious menstruation, etc.

Fatal hemorrhage from the lungs is rare. It is apt to be due to the rupture of an aneurism or large blood vessel into the lung.

Hemorrhage from a Tuberculous Lung.—This varies in degree from

blood-streaked mucus to excessive bleeding, terminating life in a few minutes. Death from pulmonary hemorrhage, however, is rare.

The patient who begins to expectorate blood should immediately be placed in a reclining position and calmly told that there is not the slightest danger. Tight fitting garments should be released and a curved basin placed to the side of the face, so that the patient may expectorate without lifting his head. Blood trickling down the face may be caught up with a napkin or a piece of cheesecloth. Nitroglycerin (gr. 1/100) is given at once hypodermically. Cracked ice is given by the mouth and an ice bag is placed on the patient's chest or over the seat of pain if in the chest. If the bowel movements have been sluggish, a soapsuds enema should be administered and a bed pan placed under the patient.

In lieu of nitroglycerin to reduce blood pressure we may administer nitrite of sodium—one grain (0,06) every three hours, or have the patient inhale nitrite of amyl, which is dispensed in pearls to be broken in a handkerchief.

Tincture of aconite in drop doses is also given to reduce blood pressure and calcium lactate in doses of gr. xv to xx (1,0-1,3) is supposed to shorten the coagulation time of the blood and may be given three times a day. Should all this fail to bring about the desired result we may try gallic acid—gr. v (0,3) every three hours or

℞ Plumbi acetatis..... gr. ii 0,12
Pulv. opii..... gr. 1/3 0,02
Sig. One powder three times a day.

In obstinate and recurrent hemorrhage from the lung the hypodermic administration of 10 to 15 c.c. of *sterile blood serum* once a day for several days was followed by happy results in several of the writer's cases after gelatin, stypticin, adrenalin and ergot had failed to stop the hemorrhage.

A ligature applied to one or more of the extremities so as to restrict the venous but not the arterial circulation is a rational procedure; also we may apply *ice* to the nape of the neck. When the patient is panicky and is unable to control his cough, morphia hypodermically—gr. ⅛ to ¼ (0,008 to 0,0016) will have a quieting effect.

Following a severe hemorrhage small quantities of food (soft diet) should be given at frequent intervals. Alcohol, tea, and coffee are interdicted. Three to eight days in bed will suffice for control of a small hemorrhage. A rise of temperature during the hemorrhage is usually due to blood absorption and requires no special treatment. If temperature continues we may suspect a renewed activity of the tuberculous process and consequently admonish further bed rest.

Dyspnea.—Shortness of breath on exertion when due to feeble heart action or to pleuritic adhesions usually disappears after a course of graded

respiratory or physical exercises. Marked dyspnea due to lack of functionating lung tissue, as in fibroid phthisis, must be left to nature and time for adjustment; moreover, a certain degree of tolerance is eventually acquired. Dyspnea due to a massive pleural exudate occasionally necessitates its removal. Dyspnea at the terminal stage of phthisis requires morphia for relief.

Anemia and Amenorrhea.—Iron and arsenic are the remedies to be employed in anemia.

Acid arsenicos—gr. 1/20 (0,003) three times a day in pill form.

Protofer tablets—one tablet three times daily.

Pleural Effusion.—A moderate serous effusion should be left *in situ* until absorbed. In the event of a massive effusion which displaces the heart, and causes urgent dyspnea, the chest must be aspirated. (*See* Section I.) If the effusion is purulent, thoracotomy and drainage are indicated.

Intrapulmonary (Intracavital) Injections.—M. R. Smirnow reports two cases of extensive and otherwise uncontrollable pulmonary hemorrhage in tuberculosis, successfully treated by the injection, under antiseptic precautions, of five grains of tannic acid dissolved in five c.c. of water, directly into the blood-filled cavity in the lung. In one of the patients this was done on two separate occasions—months apart. In every trial of the method it was quickly effective in checking the hemorrhage and relieving the patient.

He recommends the procedure to the profession in the following conditions: (1) The hemorrhage must be in a cavity and uncontrollable. (2) It must be definitely located. (3) Judgment as to the size of the cavity and its location and depth from the chest wall must be as accurate as possible. The best results are obtained when the needle enters directly into the cavity. (4) The danger of infection is great, and, therefore, the most stringent aseptic precautions must be employed. (5) Tannic acid, or any other soluble unirritating substance that will readily form a clot may be employed. (6) The low condition of the patient is not contraindicatory, as the injection is a last resort.

The author has no experience with this method and would not employ it excepting in cases in which all other methods, including the induction of artificial pneumothorax, had failed.

Surgical Control of Pulmonary Hemorrhage.—Intrathoracic surgery has made some advances in the last decade and the surgical arrest of bleeding from the lung in desperate cases is a possibility.

Prognostic Significance of Bleeding from the Lung.—Hemorrhage from the tuberculous lung does *not* make the prognosis more grave as compared with cases of pulmonary tuberculosis not accompanied by hemorrhage.

Influence of Pleural Effusion on Pulmonary Hemorrhage.—If a pleural

effusion develops in the wake of severe and repeated hemoptysis the exudate should *not* be removed. The author has observed two cases of severe persistent hemoptysis in which the bleeding was arrested as soon as the exudate appeared and in which a tuberculous process in the lung healed in the presence of a pleural effusion.

Pneumothorax in Pulmonary Tuberculosis.—Natural or spontaneous pneumothorax without symptoms of collapse need give no special anxiety. In collapse states heart stimulants, camphor, caffein, sodium benzoate or strychnia should be administered. (*See* Stimulation — Section I.)

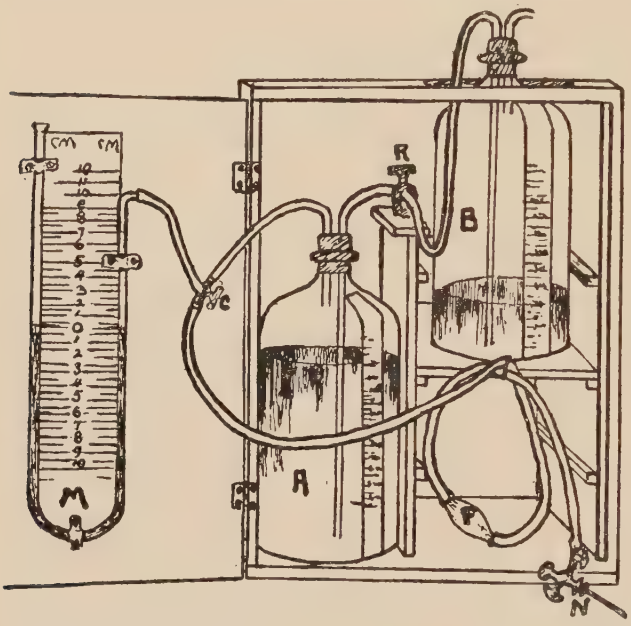


FIG. 82.—APPARATUS FOR PRODUCING ARTIFICIAL PNEUMOTHORAX. *A* and *B*, two 80-ounce bottles; *R*, ordinary stop-cock; *C*, three-way stop-cock; *M*, manometer; *F*, filter; *N*, needle.

Induced Therapeutic Pneumothorax (*Artificial Pneumothorax*). — This method of treatment aims:

1. To immobilize the lung by compression
2. To arrest hemorrhage
3. To prevent absorption of toxins by compression of the lymphatics
4. To favor coaptation of cavity walls
5. To favor new connective tissue formation in place of tuberculous tissue.

Nitrogen gas or *sterile air* is injected into the pleural space by means of a specially constructed apparatus now obtainable from surgical instrument dealers (Floyd-Robinson Apparatus). As a precautionary measure oxygen should be injected at the *first sitting* instead of nitrogen.

Contra-indications.—These consist of a progressive lesion in the opposite lung, disseminated miliary tuberculosis, endocarditis and nephritis and dense pleural adhesions. This treatment is also contra-indicated in patients who are doing well under the ordinary treatment.

Apparatus for Producing Artificial Pneumothorax.—A serviceable home-made apparatus for producing artificial pneumothorax is suggested by C. H. Vrooman, M. D., and F. W. Wittich, M. D., Kamloops, B. C.:

It consists of two 80-ounce bottles (A and B) with pierced rubber corks. These bottles are graduated into spaces of 50 c.c. by means of a strip of adhesive plaster pasted on them. The graduation is done by measuring 50 c.c. in a graduate for each space. The bottles are connected by a syphon consisting of a glass tube going to within an inch of the bottom of each bottle and connected by rubber tubing. A stop-cock (R) is inserted into the rubber tubing between the bottles.

Bottle A, which is charged with nitrogen gas, in a manner to be described, is connected by rubber tubing with the needle (N), which is inserted into the chest. The water manometer (M), which is most important, is connected with the needle by a three-way stopcock at C. This three-way stopcock by a half turn can be connected either with the manometer or with the nitrogen bottle (A). The manometer is graduated in centimeters and fastened to the door of the apparatus by brass clips. At F is a glass filter made by drawing out an ordinary test tube so that rubber tubing can be slipped over the ends. It is filled with sterile cotton and serves to filter out any foreign particles or droplets that might be carried into the rubber tubing by the gas. The needle used is the Floyd-Robinson type as described by them.[1]

To charge Bottle A with nitrogen a cylinder of compressed gas may be used, or it may be charged more cheaply and quite as satisfactorily by abstracting the oxygen from the air by a solution of pyrogallol and potassium hydroxid.

The formula which we have used is as follows: Six gm. of pyrogallol powder are placed in the graduated bottle (A), which is then filled to the 450 c.c. mark with warm water and to the 500 c.c. mark with 15 per cent potassium hydroxid solution. The bottle is corked tightly, shaken and set aside for three hours, at the end of which time practically all the oxygen will be abstracted from air within the bottle. The quantity absorbed can be measured by the amount of fluid that syphons over from Bottle B.

To operate the apparatus, Bottle B is filled with water or pyrogallol solution. To force nitrogen through the needle the stopcock between the bottles and also the three-way cock at C are opened. Fluid from B as it gradually syphons into A will force nitrogen gas through the tubing to needle. As the fluid falls in B the pressure can be maintained by raising the bottle on the movable shelf. The amount displaced can be read easily on either scale, and the flow of gas can be stopped by turning either stopcock.

When the needle is inserted in the chest the stopcock (C) is turned so as to connect the needle with the water manometer. During the operation the fluctuation and pressure in the manometer can be observed by simply turning the three-way cock (C). This closes off the gas and connects the needle with the manometer instantly. (*See* Fig. 82.)

Modus Operandi of Injecting the Gas.—The site for injecting is usually the axilla in the seventh or eighth interspace. The skin is cleansed with green soap, alcohol and tincture of iodin. Thereupon the area is anesthetized with novocain one per cent solution. The needle should be inserted with the gas shut off. When the manometer shows oscillations we know that the needle is in the pleural cavity. Thereupon the needle is shut off and the gas is admitted. After every 200 c.c. of gas the latter is shut off and a manometer reading is made. As soon as positive pressure is recorded the injections are stopped (300 to 700 c.c.). The puncture

[1] Robinson, Samuel, and Floyd (Cleveland), "Artificial Pneumothorax as a Treatment of Pulmonary Tuberculosis," *Arch. Int. Med.*, April, 1912, p. 452.

wound is finally closed with absorbent cotton and flexible collodion. Reinjections can be made at intervals at from three days to several weeks. The duration of treatment ranges from two months to two years. Improvement has been reported by many observers. A definite cure is not expected.

Suitable Cases for Treatment by Means of Artificial Pneumothorax.—In the selection of proper cases for this treatment the following considerations must be borne in mind:

1. Unilateral cases or cases with but slight involvement of the other side.
2. Cases with slight adhesions.
3. Cavity cases with much expectoration.
4. As a last resort in severe pulmonary hemorrhage.
5. Chronically recurring tuberculous pleural effusion.
6. Possibly in pulmonary abscess and bronchiectasis.

Fatal Gas Embolism During Artificial Pneumothorax.—Zink's [1] patient was a woman of forty, healthy until the tuberculous process developed in one lung two years before. Necropsy showed that the nitrogen injected under some pressure must have got into some vessel in the soft parts of the thorax, as there were no signs of injury of the lungs nor of the pleural vessel in the region where the nitrogen had been injected. Ten or fifteen seconds elapsed between the withdrawal of the needle and the first sign of embolism in the medulla oblongata; the necropsy findings were negative, as is usual in gas embolism.

If the patient survives the first collapse, various symptoms show the disturbance in the central nervous system. Generally, severe coma comes on without the slightest preliminaries. Occasionally there may be a brief aura in which the patient complains of headache or vertigo or in which he screams as he collapses. No means of resuscitation proves effectual in these acute cases.

With a more protracted course, the most frequent and an almost pathognomonic symptom of nitrogen embolism is the marbling of the skin, mostly on the extremities. In Zink's case this marbling was on the right forearm and around the puncture hole in the thorax. There was considerable fat around the heart, which certainly aided in the fatal outcome. After the first threatening symptoms had subsided the general condition seemed relatively good, so that recovery was anticipated. Even the next morning the condition did not seem menacing, until the afternoon when the heart showed serious disturbance, refractory to all measures, and the patient died at 8 p. m.

About 200 c.c. of nitrogen had been injected, the third injection in four days, and the terminal pressure had been plus 12. Zink does not think that anything was omitted which could possibly have saved the

[1] *Berl. klin. Wchnschr.*, Jan. 13, L, No. 2, pp. 49-96.

patient except that he might have aspirated out the gas when the first symptoms were observed, but he doubts whether it would not even then have been too late.

Inhalation Therapy in Tuberculosis of the Respiratory Tract.—A teaspoonful of any of the following mixtures may be added to one pint of boiling water and inhaled from a croup kettle:

℞	Creosot	ʒiss	6,0
	Menthol	ʒss	2,0
	Ol. eucalypti	ʒiii	12,0
	Tinct. benzoin, co	ʒiiss	75,0

℞	Creosot	ʒii	8,0
	Acid carbolic	ʒii	8,0
	Spir. etheris	ʒi	4,0
	Tinct. iodini	ʒi	4,0
	Spir. chloroformi	ʒii	8,0

℞	Creosot		10,0
	Tinct. benzoin, co	āā ʒiiss	10,0
	Ol. terebinth		10,0

In pharyngeal irritation the throat may be sprayed with a 2 per cent solution of menthol in albolene.

Intratracheal Injections.—Benzoinol containing one per cent menthol, guaiacol or creosote carbonate (1 to 2 per cent) is used for intratracheal injection by means of a small laryngeal syringe with a long, curved metal or hard rubber cannula under guidance of the laryngeal mirror. Four drams may be injected at one time and a cocain spray may be used to allay irritability. Absorption is rapid in the trachea.

Transthoracic Intrapulmonary Injections in the Treatment of Pulmonary Tuberculosis.—The method consists in the introduction into the substance of the lung of a fine iridium-pointed platinum needle three to five centimeters long. Through this needle there are injected into the diseased focus one to two cubic centimeters of the following solution:

℞	Iodoform	1 gram	gr. xv
	Camphor	2 grams	gr. xxx
	Guaiacol	4 grams	ʒi
	Essence of peppermint	30 drops	gtt. xxx
	Olive oil	20 grams	ʒv

According to the author's experience and observations, both *intratracheal* and *intrapulmonary* injections are of doubtful value and may be harmful.

Treatment of Pulmonary Tuberculosis By Passive Hyperemia.—The apparently well attested fact that passive congestion of the lungs from heart disease is a protection against tuberculosis of the lungs, was the starting point, it is alleged, for Bier's hyperemia treatment of surgical inflammation.

The principle of the mask was described in the *Journal of the American Medical Association,* October 15, 1910, p. 1420. It looks like a small muzzle fitting over the nose and mouth. Valves permit unobstructed expiration while inspiration is impeded more or less and can be regulated. The effect of the impeded inspiration is naturally a negative pressure in the chest; the inspiratory muscles are brought into strong contraction, inspiration is prolonged and the respiration rate lowered. Blood is consequently sucked from the right heart into the lungs, owing to the prolonged negative pressure, while there is no obstruction in the pulmonary circulation to the influx of blood—and in this is the great difference between the passive congestion of heart disease and the hyperemia induced by the aspiration mask.

Posture Method in the Treatment of Pulmonary Tuberculosis.—Dr. A. T. Tucker Wise, in the London *Lancet,* describes a method of encouraging drainage of the lungs and inducing artificial hyperemia of the apex by utilizing the force of gravitation, which he had previously observed had afforded relief in asthma, etc. In fact, he states that the idea was suggested to him by the Sylvester method of resuscitation in drowning.

Dr. Wise has constructed a table or chair which forms a double inclined plane, the patient's hips, being higher than his head and trunk, at one incline, the legs and feet being at the second incline. He uses this inclined plane at first three times a day in periods of one-half hour each; when the patient becomes habituated to the novelty, some hours may be spent in this position.

In addition to utilizing the force of gravitation for the drainage of corrupt accumulations in the lungs, an important modification of the pulmonary circulation is brought about by the forward incline of the thorax; the apices of the lungs, now in a more dependent situation, have at once a full blood supply, and some parts of the pulmonary tissue become relieved from the weight of the heart which falls forward to be supported by the sternum.

Dr. Wise reports that in large cavities loaded with heavy accumulated secretions they are emptied with comparative ease. In some exceptional cases the discharge rolls along the trachea, and is ejected without a complete coughing act.

In feverish subjects the body temperature appears to be favorably reduced, and with it the appetite and nutrition improve.

Dr. Wise advocates the prone position in early cases of pulmonary failure, certainly in preference to the dorsal decubitus.

Of course, this method should be used in conjunction with rest, exercise, diet, fresh air, and other measures of hygiene.

The posture method can be practiced by keeping the patient on his back in any ordinary bed with *head and legs* raised, but it should not be applied to patients with pulmonary hemorrhage.

Influence of Pleural Effusion on Pulmonary Tuberculosis.—There are cases on record in which a tuberculous process in the lungs healed under the influence of a pleural effusion. The influence of the compression from the effusion was evident in the subsidence of fever, reduction of expectoration and improvement in the general health and in the cessation of pulmonary hemorrhage.

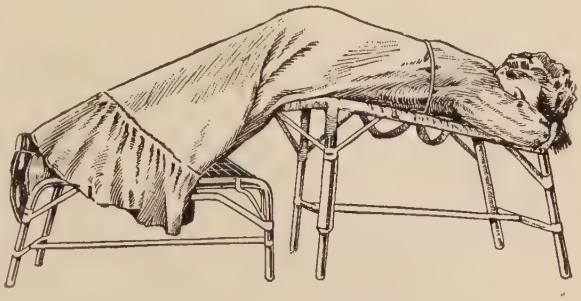


FIG. 83.—TABLE FORMING A DOUBLE INCLINED PLANE (Constructed by Dr. Wise).

Anesthesia in Quiescent Pulmonary Tuberculosis.—If an operation is to be performed on a patient with pulmonary tuberculosis, local or rectal anesthesia should be chosen instead of inhalation anesthesia with a view of preventing an old focus from breaking down through coughing due to the irritating action of ether fumes.

Fibroid Phthisis

(*Tuberculous Pulmonary Cirrhosis*)

Causes.—Local fibroid or indurative changes in the lung are not uncommon. They may follow in the wake of acute and subacute non-tuberculous inflammation or result from dust and foreign body, irritation, etc., or be due to compression by a tumor or an aneurism or may have syphilis as an underlying factor.

A *tuberculous cirrhosis of the lungs* may start and progress with the usual symptoms of pulmonary tuberculosis—cough, fever, dyspnea, hemorrhage, etc.

Symptoms.—On percussion we find dullness; on auscultation harsh bronchial breathing with bubbling râles and increased fremitus over the dull area.

Anatomically we have connective tissue contraction, associated with cavity formation partly of an ulcerative and partly of a bronchiectatic character.

The disease is usually unilateral and runs a very chronic course (twenty or more years). The prognosis is rather favorable.

Prophylactic and Therapeutic Measures.—Those already detailed apply to this as well as to the ulcerative form.

Tuberculous Pleurisy

Cause.—Idiopathic dry pleurisy as well as pleurisy with effusion is frequently due to tubercle bacillus infection.

Diagnosis.—The subjective symptoms often simulate those of myalgia, intercostal neuralgia or rheumatism. In every case of pleurisy, or of persistent pain in the chest or shoulder, which cannot be satisfactorily ascribed to other causes, tuberculosis should be suspected and a careful physical examination should be instituted to determine, if possible, the existence of a tuberculous process in the lungs or elsewhere.

The tuberculin test may be employed to confirm or exclude the tuberculous nature of pleurisy in case of doubt. The application of these principles will always lead to an earlier recognition of tuberculous disease of the lungs and to the institution of treatment at a period which will, in many cases, secure to the patient most important advantages in his prospects for recovery.

Clinical Forms.—The clinical forms of primary or secondary tuberculous pleurisy are the acute, subacute and chronic varieties, dry or with serous, purulent or sanguinolent effusion. We also occasionally observe the proliferative adhesive form which may lead to great thickening of the serous membrane.

Treatment.—The hygienic and dietetic management of tuberculous pleurisy is the same as in the pulmonary variety. During the acute stage cold compresses over and around the chest are to be employed and changed every two or three hours. Very acute pain may require the hypodermic administration of morphia (gr. $\frac{1}{8}$—$\frac{1}{4}$—$\frac{1}{2}$). If a serous exudate forms it need not be removed unless there is serious interference with respiration and the heart action.

A purulent exudate requires rib resection and drainage or suction drainage (Bier's Method. *See* Section I). After removal of the exudate the patient should be enjoined to live an outdoor life and to practice respiratory exercises. Tuberculin treatment may subsequently be employed to aid nature in throwing off the infection.

Oral and Laryngeal Tuberculosis

Tuberculosis of the Lips.—This form is quite rare, but it is occasionally observed in connection with lung tuberculosis. A sensitive lip ulcer may be mistaken for chancre, chancroid or epithelioma.

Primary Lingual Tuberculosis.—This form of tuberculosis usually begins as granulated tissue and eventually assumes the form of an ulcer which usually affects the free border of the tongue near the lip. The base

is dirty yellow, dotted with whitish specks. The borders are well defined and not undermined. There is no induration and the adjacent glands are but slightly affected. It is rarely possible to detect bacilli. The histopathological examination will exclude cancer and the therapeutic and Wassermann tests will decide the question of lues.

Tubercles and tuberculous ulcers of the hard and soft palate and pharynx, as well as of the **tonsils,** and **tuberculous deposits in adenoid**

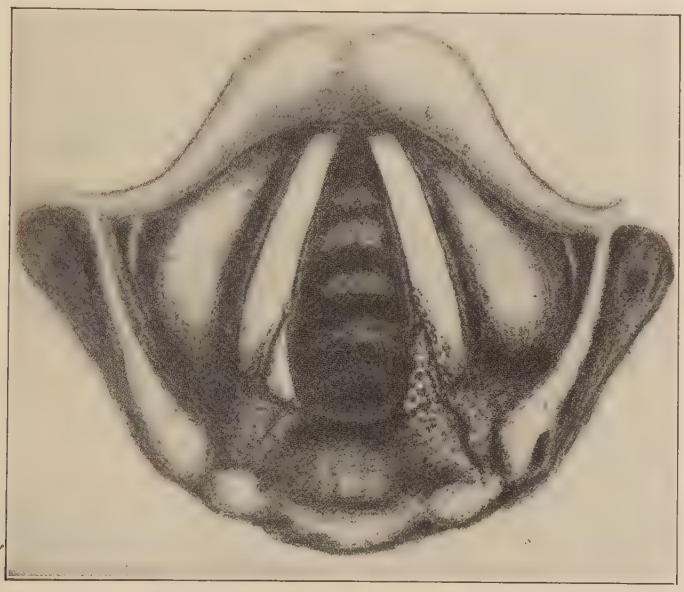


FIG. 84.—MAMMILLATED TUBERCULOUS HYPERPLASIA WITH A FURROW AT THE VOCAL ANGLE, WHICH IS ONE OF THE EARLIEST AND MOST DISTINCTIVE OF THE INITIAL LESIONS. (Case of W. E. Casselberry, M.D., Chicago.)

tissue occasionally accompany chronic ulcerative phthisis, all of which present difficulties of diagnosis as between tuberculosis, syphilis and malignant disease. The same may be said of *nasal* and accessory sinus *tuberculosis.*

Treatment of this Group of Cases.—Treatment is hygienic, occasionally specific and local. Cauterization with the actual cautery, with pure concentrated trichloracetic or lactic acid, is usually indicated. Treatment with x-rays and radium is in the experimental stage. When broken down cervical glands are in evidence their surgical removal is frequently demanded.

Tuberculosis of Epiglottis and Larynx.—Primary laryngeal tuberculosis is a possibility but in the vast majority of cases a latent tuberculous focus in the lung coexists or precedes the laryngeal lesion. It is estimated that about one-fourth of all cases of pulmonary phthisis present laryngeal lesions with symptoms of hoarseness and occasionally dyspnea.

Diagnosis.—A satisfactory diagnosis is not possible without a laryngeal examination.

The differential diagnosis between simple, tuberculous, luetic and malignant lesions is facilitated through the aid of the Wassermann and tuberculin tests, but errors in diagnosis are not rare.

Forms.—Clinically we recognize various forms:

1. Miliary nodules
2. Infiltration
3. Ulceration with or without papillary outgrowths
4. Tuberculous tumors.

Treatment.—Apart from hygienic and specific management the treatment is principally local. The main symptoms to overcome are pronounced hoarseness, dysphagia, dyspnea and pain.

The climate which benefits pulmonary tuberculosis will also benefit the laryngeal troubles.

The Silence Cure.—Complete vocal rest is a valuable factor in treatment; even ulcerative lesions have cicatrized completely in a few months.

Menthol or orthoform in oil emulsion may be applied locally as a spray or by endolaryngeal injection. Inhalations elsewhere enumerated are palliative to some extent. Curettage and cauterization with lactic acid are not much in favor at the present time.

Treatment by means of x-rays, radium or the high frequency currents is still in the experimental stage.

It is claimed that a low tracheotomy if done early gives very good results. Before resorting to operative measures under suspension laryngoscopy the patient should have the "benefit of the doubt" (iodid of potassium).

The formula of the orthoform emulsion as given by Freudenthal is as follows:

℞	Orthoform	6 grams	ʒiss
	Menthol	0,5 to 4 grams	gr. 8 to ʒi
	Hexamethylenamine	0,50 gram	gr. 8
	Sweet almond oil	15 grams	ʒiv
	Powdered acacia	10 grams	ʒiiss
	Water	ad 60 grams	ʒii

M. f. emulsio.

Laryngeal Tuberculosis and Pregnancy.—Kuttner gives an exhaustive study of this combination and concludes that the prognosis of diffuse tuberculous laryngitis occurring during pregnancy is extremely unfavorable. The mortality of children born of mothers suffering from this disease during gestation is very high.

In consideration of these facts laryngeal tuberculosis is in principle a

justifiable indication for the interruption of pregnancy, but this is permissible only when it appears to be the only possibility and offers some probability for the safety of the mother. Experience has shown that the induction of abortion in the later months of pregnancy does not offer very favorable prospects. Under these conditions, if the case is not already hopeless, tracheotomy may give a chance.

Tuberculosis of the Gastro-Intestinal Tract Including Peritoneum and Omentum

Superficial and ulcerative esophageal tuberculosis is usually an extension from the larynx or pharynx and is accompanied by pain and dysphagia. An ulcer perforating into the pleura may cause purulent pleurisy. Even with direct vision (esophagoscopy) the differentiation between simple, luetic, tuberculous or carcinomatous ulcers may be difficult.

Stomach Tuberculosis.—Tuberculosis of the stomach is rare but it may arise in the following ways:

1. By continuity or contiguity of structure. This is probably the most frequent mode of entrance.
2. Hematogenous infection as part of a general miliary tuberculosis.
3. By ingestion of tubercle bacilli.
   (*a*) Through a healthy mucosa.
   (*b*) Where there is some predisposing change in the mucosa.

The frequency of hyperchlorhydria with hypersecretion in pulmonary tuberculosis will explain the frequency of gastric ulcer, but it is not likely that tubercle bacilli will be able to fasten themselves on the stomach in the presence of free hydrochloric acid.

When the pylorus is involved or compressed by bunches of tuberculous glands symptoms of stenosis are in evidence.

Treatment.—Apart from the hygienic and specific management the treatment of esophagus and stomach tuberculosis is palliative.

A diet suitable for cases of gastric ulcer is to be enjoined. If stenosis develops gastro-enterostomy is indicated. Morphia and chloral hydrate are given to relieve pain.

Tuberculosis of the Intestines.—In intestinal tuberculosis, which is frequent, we have the miliary ulcerative and hyperplastic forms.

The following clinical varieties are observed:

1. Tuberculous enteritis.
2. Tuberculous ulcers.
3. Chronic hyperplastic intestinal tuberculosis.
4. Tuberculous appendicitis.
5. Tuberculous cecal tumors.
6. Tuberculosis of rectum (with or without fistula in ano).
7. Tuberculosis of hernial sac.
8. Miliary tuberculosis of intestines.

Vicarious Action of the Bowels in Consumptives.—Vicarious action of the bowels in consumptives is not to be confounded with tuberculous enteritis. It is well known to clinicians that consumptives occasionally complain of diarrhea of long standing which is not due to bowel ulceration and that nature in such cases endeavors to protect the system by eliminating toxic material.

In intestinal tuberculosis lymph nodes and peritoneum are frequently involved. A perforating ulcer may give rise to peritonitis and cicatricial bowel obstruction may occur. Intermittent pain and diarrhea are the chief symptoms of bowel tuberculosis—stricture and peritonitis the chief sequelae. Chronic hyperplastic tuberculosis of the ileocecal region may simulate chronic appendicitis or neoplasm.

General infection of tuberculosis may occur by way of the intestines as the portal of entry and yet leave no evidence in the intestine.

Differential Table.—Boas [1] gives the following differential table:

CECUM TUBERCULOSIS	CECUM CARCINOMA
Age.—Between 20 and 40 years.	*Age.*—Rare before fortieth year.
Duration.—From 2 to 3 years.	*Duration.*—Eight to nine months.
Lungs.—Pulmonary tuberculosis evident more or less.	*Lungs.*—Negative.
Tumor.—Elongated; the intestine is palpable as an infiltrated thickened cylinder.	*Tumor.*—Sharply circumscribed, intestines not palpable.
Stenosis.—Always present, develops slowly, accompanied by striking, splashing and musical sounds.	*Stenosis.*—Develops rapidly, acoustical signs not so pronounced.
Stool.—Blood and pus rare, tubercle bacilli frequently present.	*Stool.*—Blood and pus frequently observed; tubercle bacilli absent.
Fever.—Generally present.	*Fever.*—Exceptional.
Urine.—Ehrlich's diazo-reaction positive.	*Urine.*—Diazo-reaction negative.

Prognosis.—Intestinal tuberculosis in the presence of pulmonary tuberculosis makes the prognosis very grave.

Prophylaxis.—Removal from a tuberculous environment, sterilization of milk, avoidance of auto-infection from swallowing the sputum, are the main prophylactic measures.

Treatment.—Hygienic and specific treatment are elsewhere discussed in detail. Under all circumstances an out-of-door rest cure is advisable.

[1] Boas, "Verdanungskrankheiten."

In cold weather the patient will appreciate a hot water bag on the abdomen.

Diet.—A bland, non-irritating and binding diet such as we give in simple enteritis, colitis and dysentery is applicable in tuberculous enteritis. (*See* Diet, Section I.)

Oatmeal, barley gruel, burnt-flour gruel, acorn coffee, rice, tapioca, farina, mint tea, beef-tea with egg, toast, black tea, cocoa, or claret should be the diet for a few days at least.

For the diarrhea we prescribe for adults:

℞ Acid tannic..... gr. v-v 0,3 ad 0,6
Pulv. opii..... gr. ¼ to ½ 0,015 ad 0,03
One such powder to be given in a wafer two or three times a day.

℞ Bismuth subcarb..... 1,0 gr. xv
Pulv. opii..... 0,03 gr. ½
M. Sig. One such powder in water two or three times a day.

Astringent clysmata or suppositories are of no avail unless the ulcerative process is in the lower rectum.

Irrigation of the bowel from above by means of duodenal lavage may be tried. (*See* Section I.) The bowel can be irrigated from above through an artificial appendicular opening.

Anal Fistulae.—Anal fistulae usually require surgical aid.

Tuberculosis of the Peritoneum and Omentum.—*Causes.*—The infection of the peritoneum may come about by way of the circulation or through the gastro-enteric or genito-urinary tract. In many cases measles and pertussis are the antecedents.

Clinical Varieties.—The clinical varieties of tuberculous peritonitis are:

(*a*) Chronic tuberculous ascites (miliary form).
(*b*) Fibrocaseous form.
(*c*) Fibro-adhesive form.
(*d*) Tuberculous intraperitoneal tumors.
(*e*) Perforating intestinal ulcer with miliary tuberculous peritonitis.
(*f*) Perforating tuberculous ulcer with purulent peritonitis.

Prophylaxis.—Apart from the general prophylactic measures elsewhere enumerated it is well to remember that children who are fed by bottle should have their milk food pasteurized or sterilized unless the supply is clean beyond question. In the environment of a careless consumptive, children are in great danger of becoming infected. Carelessly deposited sputum may soil toys, pacifiers, and spoons and may eventually reach the child's mouth.

Treatment.—According to the writer's experience, based upon an ob-

servation of about three hundred cases, hygienic and specific management should first be tried. This may be followed by marked improvement (absorption of ascites and retrogression of palpable nodules); if not laparotomy should be performed. Peritoneal tuberculosis arising from the cecum, appendix or tubes or as an extension from a perforating intestinal ulcer, is, as a rule, not cured by medication, hygienic and dietetic measures.

If at the time of operation we have coexisting pulmonary tuberculosis, the ultimate results are unsatisfactory. In opening the abdomen in males, it is wise to make the incision so that the appendix may be explored, and in women the pelvis.

When extensive adhesions are present, local manipulation is occasionally followed by fecal fistula.

Genito-Urinary Tuberculosis

The question as to a primary descending kidney tuberculosis has not been definitely settled. Cases of interstitial tuberculous nephritis are on record in which, however, the apices of the lungs were also involved. The principal subjective symptoms are frequent urination, pain and hematuria.

Based upon the investigation of one hundred cases of urogenital tuberculosis, conducted in the Basel Pathologico-Anatomical Institute,[1] the following conclusions are reported:

1. Urogenital tuberculosis is invariably combined with pulmonary tuberculosis.
2. The meninges are involved in over 35 per cent of the cases of urogenital tuberculosis (meningitis tuberculosa).
3. The male sex is more frequently attacked than the female.
4. The third decade of life represents the most susceptible period in both men and women.
5. Isolated tuberculosis of the sexual organs is of much more common occurrence in women than in men.
6. Urogenital tuberculosis originates almost invariably by the hematogenous route, either in one center, or in several centers, such as the prostate gland, the epididymis, or the kidney; simultaneously, or at short intervals.
7. The disease may take a course with or against the stream of the secretions.
8. The prostate gland in many cases is affected at an early stage, and perhaps frequently first of all the organs.
9. The prostate gland plays a not inconsiderable part in the distribution of the tuberculous process.
10. In the female genital apparatus the tubes are equivalent to the prostate in the male, in regard to the frequency of infection with tuberculosis.

When tuberculosis of the kidney or urinary tract is suspected we hunt for the bacillus. However, the mere presence of bacilli in the urine is not in itself a proof of kidney involvement. If the kidney can be palpated and is found to be enlarged and tender, and if the urine on repeated exploration contains pus and

[1] Rautbread, "Inaugural Dissertation," Basel, 1908.

tubercle bacilli, the diagnosis is no longer in doubt. A unilateral lesion is made out by segregating the urine.

Treatment.—The form of treatment—expectant, palliative, specific or operative, must be decided upon for each individual case.

When the symptoms are mild, hygienic and specific treatment may be instituted. Creosote and urotropin may be given internally and water should be taken in abundance. Inasmuch as pathological conditions of the kidney depend somewhat on its mobility or abnormal mobility a well fitting abdominal binder should be worn by the sufferer. Before extirpation of one kidney is decided upon or attempted, the surgeon must be sure as to the condition of the other kidney.

In *bladder tuberculosis,* irrigations with ichthyol water (5 per cent) and other non-irritating antiseptic solutions may be tried. Direct local treatment of ulcers and granulating surfaces by iodoform emulsion is rarely of lasting benefit. Direct cauterization or fulguration after a suprapubic cystotomy and other surgical measures have been employed with varying success.

Spontaneous Healing of Renal Tuberculosis.—In routine necropsy work during the last few years, Harbitz found signs of an old tuberculous process in a kidney in twelve cadavers; it had evidently run its course and become encapsulated spontaneously, with what amounted to a clinical cure. In some of the cases the renal tuberculosis had existed for four, six, eight or ten years, and even twenty years in one instance. The processes were of all kinds from the ulcerative to the "sclerosing." In six of the cases the chronic process had become completely encapsulated and the pelvis and ureter were entirely obstructed. Of special interest is the finding that a tuberculous process in the bladder has evidently healed completely after the kidney lesion above had been thus walled off. The data presented reaffirm the rarity of primary tuberculous lesions in the bladder; also that the bladder becomes affected comparatively late in the course of renal tuberculosis, and also that the bladder process generally heals when the kidney process is removed or encapsulated.

In one of the cases reported the tuberculous lesion in the kidney had perforated outward, and yet the hole had healed spontaneously and the fistula had closed. In four of the cases the kidney process had caused trifling clinical symptoms. A tuberculous focus in the kidney is a constant menace to the rest of the organism. Two of the above-mentioned patients succumbed to secondary meningitis or miliary tuberculosis, and three to nephritis in the other kidney. Another point brought out by this material is that congenital malformations or displacement of the kidney seem to play an important part in inviting the development of a tuberculous process in a kidney. This was evident in three of the above cases.

Tuberculosis of the Female Genitals

(Uterus and Tubes)

As tubercle bacilli have been found in the semen of phthisical patients, it is supposed that the infection may take place by coitus in addition to the ordinary paths. In the uterus the disease may be corporeal or cervical and may be miliary or ulcerative. The disease may present the features of an ordinary endometritis. The tubes are the seat of disease in a large proportion of cases. A pregnancy may continue even in extensive tuberculosis of the genitalia, but it hastens the development of the latter. The course is very slow and spontaneous; healing is rare. Operative removal of the focus is the only treatment if hygienic and specific measures fail.

Skin Tuberculosis

Tuberculides.—Papulonecrotic and papulosquamous tuberculides are small, round, slightly raised, rather hard, flat papules ranging in size from a pinhead to a millet seed, of red to reddish-brown to livid brown color and as often presenting on their surface a small dry crust which is easily removed, leaving a whitish, central depression, with occasionally a small bleeding point in its center. If put on the stretch they have a glistening appearance. They are easily overlooked.

Modern research has demonstrated the presence of tubercle bacilli in seventy per cent of such cases. The lesion may appear on any part of the skin, but is found mostly on the arms and lower part of the back and on the extensor surface of the lower extremities. At times the tuberculides are the only evidence of tuberculosis and are therefore of diagnostic importance.

Lupus Vulgaris.—These are minute soft papules like apple jelly. They form mostly upon the face, nose, cheeks and ears, developing into nodules or tubercles, which coalesce and form dull red raised soft patches. The patches may retrograde, leaving scarred atrophic skin, or they may ulcerate, leaving crusts, cicatrices or bleeding granulations.

Treatment.—Treatment of the different forms of skin tuberculosis is hygienic—specific by actual cautery or by chemical caustics with subsequent dressings of iodoform or balsam Peru ointments and by radiation, x-rays, radium, high frequency currents and concentrated light (Finsen).

Tuberculosis of Locomotor Organs

(Bones, Joints, Bursae, Tendons and Periosteum)

Primary general tuberculosis of bone is considered to be very rare.

Localized tuberculosis is seen in the cancellous tissues of the carpus and the phalanges (spina ventosa to be distinguished from luetic dactyl-

itis), in the bodies of the vertebrae, and in the end of long bones. In the latter position the joint is frequently involved. The pathological process is similar to that of other forms of bone inflammation except that it is more chronic and shows characteristic caseation and softening. We observe, therefore, tuberculous osteoperiostitis, osteomyelitis and bone and joint abscess. Pain and tenderness are not marked in the beginning and usually the first symptom to attract the attention of the patient is swelling.

FIG. 85.—TUBERCULOSIS OF FLEXOR TENDON SHEATHS OF HAND. Especial distention of sheath of middle finger; sinus in palm. Patient a boy aged six years. (After Foote, "Minor Surgery.")

When the marrow is infected the radiograph shows, early in the process, definite shadows of various size.

Invasion of Muscles and Bone Marrow by Tuberculosis.—Sforza and Cosco inoculated numbers of guinea pigs with scraps of muscle or bone marrow from tuberculous cadavers, striving to determine the extent to which these tissues are invaded by tubercle bacilli. The findings in forty cases are tabulated; the guinea pigs showed no signs of infection when inoculated with muscle tissue, as a rule, while nearly all died that had been inoculated with bone marrow.

Bursitis and Tendosynovitis occur in three forms:

1. Distention by serum accompanied by the presence of so-called rice or melon seed bodies.

2. In the second form the cavity is lined with a thick layer of tuberculous granulation tissue.

3. In the third and rare form there is an overproduction of fibrous tissue with massive thickening.

As to location, the tendon sheaths of hands and wrists, hamstring and shoulder joints are commonly affected.

Bursal tuberculosis is found usually in the prepatellar, olecranon, subdeltoid, subpsoas and gluteal bursae.

An indolent, doughy swelling at a bursal site or over a tendon sheath leads to a suspicion of tuberculosis. In bone and joint tuberculosis the exciting cause is usually traced to some injury, but sometimes there seems to be no exciting cause. The swelling at a joint becomes spindle-shaped and white (white swelling) and may fluctuate in the presence of serum or pus. Pain is not intense unless the bone is involved. If muscular spasm is in evidence the function of the joint becomes impaired; perforation and sinus formation and bone destruction may take place and systemic infection is possible at this time. Some cases run a course for years and recover with ankylosis. If we recognize the early muscular spasm stage we may be able to bring about healing with slight ankylosis.

Principles of Treatment

Rest, extension, fixation, general tonic, hygienic and climatic treatment are the fundamentals in the management of surgical tuberculosis. Bier's hyperemia treatment consists in creating congestion of a tuberculous joint by applying an elastic bandage above (*see* Section I). The injection of 10 per cent iodoform in glycerin (2,0-5,0 in children) has been found a useful adjuvant, also injections (5,0-10,0 in adults) of formalin glycerin (Murphy) or a 10 per cent thiocol glycerin (Heckmann).

Tuberculin Treatment.—Tuberculin treatment is particularly applicable in bone and joint tuberculosis in connection with the general management outlined above. The dosage is that recommended under Pulmonary Tuberculosis and the duration of treatment with tuberculin depends upon each individual case. The application of radium and Röntgen rays is in its experimental stage.

Results of the Open-air Treatment in Surgical Tuberculosis.—All forms of surgical tuberculosis are amenable to treatment by the open-air method. This form of treatment will not only give relief, but may produce actual cure. From two to three years may be required. Whether out-of-door salt air is more efficacious than out-of-door inland air, has not as yet been definitely established. The greatest and most successful European hospitals of this class are upon the seashore. The reports from an experimental hospital for the sea air treatment of surgical tuberculosis located at Sea Breeze, Coney Island, are very encouraging.

Heliotherapy in Tuberculosis.—At Leysin, Switzerland—which is at

an elevation of 4,000 feet and has a dry dust-free atmosphere and is free from insects, with intense sunlight with little wind and an equable temperature—Dr. Rollier, in 1903, inaugurated the first clinic for the exclusive treatment of surgical tuberculosis by sunlight. The demonstration of the good results obtained as controlled by photograph and radiograph is convincing.

Treatment of Various Forms of Tuberculosis in Rollier's Clinic.[1]

Spondylitis.—These patients are put to bed and immobilized, as mentioned before. Children, if they wear a jacket, have a large fenestrum cut anteriorly, as the vertebrae in children are not much further removed from the surface of the abdomen than from the back. A gibbus, if present, is padded with cotton or a pillow, or, more frequently, the patient is placed on the abdomen with a triangular pillow under the chest. This position increases lordosis, and prevents or, when present, decreases the gibbus. After healing is verified by röntgenoscopy, a celluloid corset is worn. These cases require from one to two years.

Coxitis.—An extension is applied in bed and the pelvis is elevated on a pillow, to expose the entire coxofemoral trochanteric region to the sun. At the same time this avoids contractures. Abscesses when not absorbed are aspirated. The treatment requires at least a year, but splendid functional results are obtained.

Lymph Nodes.—Bronchial lymph nodes and lymph nodes of the neck have yielded beautifully to this treatment. In some cases the lymph nodes disappear spontaneously. In others it becomes necessary to aspirate; but even when there are sinuses the end results are good, and the scars, as a rule, less disfiguring than in operative cases complicated by infection. The treatment is continued for six months to two years.

Tuberculosis of Peritoneum and Ileocecal Tuberculosis.—Even in these cases the prognosis as a rule is good. Under the influence of the sun and fresh air the pain soon subsides, exudates in the abdomen become absorbed; large tumor masses in the ileocecal regions, which were declared inoperable by Roux, disappeared and healing took place.

Genito-urinary Tuberculosis.—The principal effects of heliotherapy in these sad cases is the lessening of pain and the amelioration of distressing bladder symptoms.

Tuberculosis of Bones of Hands and Feet.—Tuberculosis of the bones of the hands and feet offers an especially good prognosis.

Closed Tuberculosis of the Pelvic Bones.—This form is amenable to this treatment, but a mixed infection in cases of sacro-iliac tuberculosis makes the case practically a hopeless one.

Combined Local Tuberculosis and Tuberculosis of the Lungs.—Patients with a combined local tuberculosis and tuberculosis of the lungs often show a marked improvement of the condition of the lung. As Rollier, by his method, exposes the thorax last, he has seen no ill effects such as hemoptysis. He says that bad effects such as congestion of the head, nausea, apoplexy, etc., are seen only when the method is improperly used and we fail to individualize.

Rollier's results have attracted attention the world over, and such men as Bardenheuer, von Eiselsberg, Escherich, Kocher and others have written enthusiastically about the work at Leysin. Bardenheuer, who had very radical views on the treatment of surgical tuberculosis, now rarely resorts to a resection. He says, "Resection of a joint is a mutilating operation compared to Rollier's results."

[1] Reported by Dr. H. Dittrich, Los Angeles, Cal.

The drawback to this treatment is the length of time required. The charges range from seven to ten francs a day.

Illustrations taken from an article on heliotherapy by Gertude Austin, Paris, France, appeared in the New York *Medical Record,* June 8, 1912.

Children are exposed for hours daily without clothing to the sun's rays in midwinter.

Tuberculous Adenitis

Tuberculous adenitis is more common in children and young adults, but it is met with in all ages. Infection takes place through the skin or mucosa—principally the mucosa—and a catarrhal condition of the mucous membranes is a predisposing factor. Pyogenic infection of lymph nodes must not be mistaken for the tuberculous variety.

The faucial and pharyngeal tonsils (adenoids) drain into the neighboring glands and through anastomosis with retrosternal, peritracheal and bronchial glands, infection can be disseminated and is in fact carried to the pleura or apices of the lungs.

Acute tonsillar tuberculosis is found as a part of miliary tuberculosis or as a metastatic process in the terminal stages of pulmonary tuberculosis. The chronic form of tonsillar tuberculosis is usually latent and presents no symptoms. Thus if we remove tuberculous glands surgically we must also remove diseased tonsils and adenoids.

The *tracheobronchial and mediastinal glands* may also become infected through the esophagus and when infected are responsible for a variety of clinical manifestations, such as obscure continued fever, obscure and harassing cough, and sudden death from suffocation due to the breaking through of a bronchial gland into the bronchus. Various pressure symptoms due to pressure on the superior cava, on the pulmonary artery or azygos vein have been traced to enlarged peribronchial glands. The recurrent laryngeal nerve may suffer irritation and the esophagus may be involved in inflammatory adhesions due to glandular inflammation. Also pericarditis may be one of the sequences. A positive diagnosis of peribronchial adenitis is difficult, unless we obtain a distinct x-ray shadow of the enlarged nodes. Visible enlargement of thoracic veins and a characteristic spasmodic and bronchial cough are also much in evidence in such cases. D'Espine's sign—paravertebral percussion dullness—is occasionally elicited.

Tubercle bacilli may penetrate the intestinal wall—particularly during the course of diarrheal disorders, and are then carried by the lymphatics to the mesenteric glands and from there into the thoracic duct and into the blood stream. When the mesenteric glands are extensively involved absorption from the intestine diminishes; the abdomen is at first distended; diarrhea and offensive stool are in evidence; fat appears in the stools and the patient emaciates (marasmus).

The *inguinal group of lymph nodes* usually receive their infection from adjacent mucosa and skin.

The *prelaryngeal group* receives its infection from the larynx.

A generalized tuberculous adenitis clinically resembles Hodgkin's disease and is usually fatal from cachexia or meningitis. When there is a question between the two the von Pirquet test should be made, but should not be relied upon exclusively. The histopathological examination of an extirpated gland and the blood findings will eventually establish the true nature of the infection.

Latent Tuberculosis of the Lymph Nodes in Infants

Recently the question of latent, or as the French call it, larval tuberculosis, has engaged a great deal of attention, especially since von Behring's pronunciamento that tuberculosis in adults is a development of the latent tuberculosis acquired from the alimentary tract in infancy.

In our battle against the white plague the early recognition of latent tuberculosis in children by the medical profession, is the *sine qua non* of a successful campaign.

Prophylaxis and Treatment.—The safeguarding of young individuals against tuberculous lymph node infection is our main concern in the battle against tuberculosis. All rational preventive measures are fully discussed elsewhere and therefore require no special reiteration.

What we urgently need is an *artificial immunizing agent for infants* who have not inherited a natural immunity. All portals of entrance must be kept "clean" and local inflammation of skin and mucosa should receive early antiseptic protection. This applies particularly to the nasopharynx and to the external genital region. After the removal of adenoids, diseased tonsils and carious teeth infected lymph nodes may throw off their poison.

Abdominal lymph nodes in children predisposed to tuberculosis are more readily infected during and after attacks of inflammatory diarrhea and at such time all feasible prophylactic measures must be applied, including the sterilization of cow's milk.

The feasibility of inaugurating a specific therapy in bona fide cases of tuberculous adenitis must be decided for each individual case and treatment should begin with 1/1,000,000 of a milligram of tuberculin (or the emulsion) as elsewhere specified. No permanent good results can be hoped for in cases in which an outdoor life is not secured.

In advanced cases of mesenteric gland tuberculosis the lymphatic system is blocked so that certain foodstuffs fail to be absorbed (marasmus). We must regulate the diet in accordance with the stool findings. Frequently a fat diarrhea is in evidence and we may be compelled to eliminate the fat from the diet and supply the caloric needs by carbohydrates and protein.

If in spite of prolonged general treatment the accessible glands continue to increase in size or abscess and fistulae should form, surgical measures must be taken into consideration (incision, scraping or extirpation). Instead of using the knife we may, for cosmetic reasons, prefer to inject a ten per cent emulsion of iodoform in oil. This method is to be recommended only in cases in which there is but a single tuberculous lymph node or abscess.

Another way of avoiding extensive scar formation is to make a small incision in the line of the skin fold under local or general anesthesia and attempt the removal of glandular débris and pus by Bier's suction method. The suction cup may be applied daily for an hour, five minutes at a time, with an intermission of several minutes.

The chapter on the management of lymph node tuberculosis would be incomplete without drawing attention again to the remarkably good results obtained by Rollier at Leysin, Switzerland, by means of *heliotherapy* in glandular and surgical tuberculosis—results which undoubtedly can be realized in our own climate under private or institutional management.

Röntgen Ray Treatment of Tuberculous Adenitis

Dr. A. F. Holding, of New York,[1] reports very satisfactory results with x-rays in the treatment of glandular tuberculosis.

The technic employed is that known as Röntgen deep therapy. The essentials of deep Röntgen therapy are the use of the Coolidge tube, high voltage, measured maximum skin dosage, cross-firing, and filtration of the rays, given in three to ten series of treatments. If the dose to each skin area is limited to 15 x Kienbock, no disagreeable skin symptoms will follow.

General antituberculosis treatment may be carried on as well as the x-ray treatment. In cases failing to respond promptly, hyperemia may be induced by Bier's method or even more effectively by thermopenetration and high frequency vacuum electrode discharges.

Acute Miliary Tuberculosis

In all probability this is not a primary infection but an endogenous infection from some focus in some tissue, because the tubercle bacilli do not ordinarily appear to have the power of rapid proliferation. In this disease there is an abundant development of miliary tubercles in a short time and involving many organs, an overwhelming invasion of tuberculosis from some internal focus, which prepares and furnishes the enormous number of bacilli which are needed to create innumerable miliary tubercles. This rapid invasion is supposed to be due to foci in the veins and in the thoracic duct with subsequent dissemination through the blood stream.

Such a generalization of the specific process sometimes follows trauma-

[1] *Med. Rec.*, March 11, 1916.

tism (surgical operations—intubation). It is also known to follow in the wake of measles and whooping-cough.

Clinical Forms of Miliary Tuberculosis.—

1. Typhoidal form with symptoms of a general infection in which bacilli have been found in the blood.

2. Pulmonary form with predominant pulmonary symptoms.

3. Meningitic form with predominant cerebral symptoms and bacilli in the cerebrospinal fluid.

4. Prolonged intermitting form.

Diagnosis.—Of diagnostic importance is

(*a*) The rapid emaciation of persons afflicted.

(*b*) Catarrhal signs appear first in the smaller and then extend to the larger bronchi.

(*c*) The tuberculin test.

In doubtful cases the bacteriological examination of blood, feces, secretions and spinal fluid is indicated. The appearance of tubercles of the choroid or of miliary tubercles on visible membranes removes all doubt.

Prophylaxis and Treatment.—Realizing that miliary tuberculosis is an endogenous infection from some focus in some organ or tissue, the removal of tuberculous glands and of accessible foci of tuberculosis, in a manner not to favor dissemination, is the rational preventive management.

In the absence of a curative specific antitoxin, we can do little better than to employ prolonged warm baths, a liquid nourishing diet, stimulation (whisky and camphor—gr. i (0,06) every 4 hours) and guaiacol carbonate internally, with the hope of overcoming an infection which is usually fatal to the host.

Tuberculosis of the Central Nervous System

Cases of tuberculosis of the cerebrum and cerebellum with external pointing of a caseous mass, or cases of solitary brain tubercles, are quite rare—they give the symptoms of brain tumor. In vertebral tuberculosis the cord and meninges may suffer by continuity.

Tuberculous Meningitis

Tuberculous meningitis on the other hand is not a rarity. Miliary deposits are found in the pia, from where they may extend to the cerebral cortex. The pathological findings at autopsies indicate that:

1. Tuberculous meningitis is a secondary condition. This shows the uselessness of local treatment.

2. In about 60 per cent of cases the bronchial glands are the seat of primary infection.

3. In about 20 per cent of cases the mesenteric glands were infected and the bronchial glands were free.

4. In 8 per cent the inner ear appeared as the primary seat.

5. In 6 per cent joints and bones showed primary involvement.

Diagnosis.—Lumbar puncture as a means of diagnosis shows a clear fluid in which tubercle bacilli are readily found in about 10 per cent of cases.

Clinical Course.—The onset of the disease is usually gradual. Slight abnormalities may be noticed for some months preceding the final illness.

The child tires readily; avoids playing with other children; the appetite diminishes; and the mental state noticeably alters. The facial expression, especially the appearance of the eyes, changes and the child rapidly loses weight. Slight headaches may be complained of and there may be a convulsive seizure.

The *prognosis* is bad, but it is important to know that there are cases of protracted remission of from four to nine months' duration.

During the quiescent stage, certain manifestations on the part of the pulse, temperature, psychical condition, and nervous system point to an incomplete arrest of trouble. The lumbar fluid still contains an increased number of leukocytes. The lethal period is characterized by an abrupt onset and a very rapid course.

The anatomical explanation of these remissions consists in the primarily localized disease of the meninges, which may undergo fibrous change. However, a new crop of tubercles in the vicinity constitutes a permanent danger.

Prophylaxis and Treatment.—As tuberculous meningitis is a secondary condition we are powerless to ward off this complication, other than by the general prophylactic and therapeutic management elsewhere discussed.

Local treatment by means of subdural injections of various antiseptic chemicals have no influence in arresting the disease nor has tuberculin treatment given satisfactory results.

Sodium salicylate—gr. xv (1,0) in combination with potassium iodid —gr. v (0,30) dissolved in one ounce of warm water and given per rectum three times daily with the hope of changing the soil, may be tried.

Chloral hydrate and sodium bromid in sedative doses, according to age, by mouth or per rectum, will quiet the patient.

Lumbar puncture is valuable also as a measure of relief—that is to say, screaming, sleeplessness, headache, and unconsciousness are often removed for a time.

Rare Forms of Tuberculosis

Thyroid Tuberculosis

Thyroid tuberculosis may suggest malignant struma.

Tuberculous Parathyroiditis

P. Carnot and Delion [1] report a case—interesting on account of the coexistence of convulsive crises and parathyroid lesions—in a young

[1] *Le Bul. Med.*, Nov. 8, 1905.

woman twenty-four years old who was tuberculous. The convulsive crisis developed brusquely. This final crisis lasted eight hours and was terminated by death. The movements recalled at the time those of chorea, of athetosis, and of tetany. At the autopsy, on account of the convulsive phenomena, the parathyroids were carefully examined. The internal organs showed no special change but the right external one was completely lacking while the left was caseous. Since there were no changes in the meninges or in the kidneys, it seemed logical to attribute these convulsions to parathyroid insufficiency.

The writers believe that this case is related to those in which tetanic convulsions are observed in patients after certain total parathyroidectomy. It also recalls those recent clinical researches concerning the parathyroid origin of certain tetanies and of certain eclampsias. The writers believe that in any case, it is the first reported example of a spontaneous anatomico-pathological lesion localized in the parathyroids and accompanied by fatal convulsions.

Primary Tuberculosis of the Spleen

A few cases of primary tuberculosis of the spleen are on record.

Tuberculosis of the Heart

A Remarkable Case of Tuberculosis of the Heart.—Knauth describes this case, in which the patient was a young man who for nearly a year suffered from a variety of symptoms, of which the most conspicuous were pallor, emaciation, night sweats, and enlargement of the heart. For nine months he was able to do his ordinary work as a household servant, when he manifested symptoms pointing to a general miliary tuberculosis with tuberculous meningitis.

After an illness of about six weeks he succumbed, and at the autopsy, it was found that the entire heart had apparently been transformed into a mass of pus. Closer examination revealed that almost the entire thickness of the cardiac musculature had been irregularly eroded by the degenerative process, so that only a very thin septum of muscle remained between the endocardium and the broken-down tissues. This condition had remained entirely unsuspected, as up to the time of death, the pulse had been of excellent quality, and it was particularly remarkable that the man had been able to be up and about, attending to his work during so long a period, while this extensive destruction of cardiac tissue was going on.

Tuberculosis of the Pericardium.—Tuberculosis of the pericardium is occasionally found at autopsies.

Ocular Tuberculosis

Tuberculosis of the skin of the eyelids is very rare.

Tuberculosis of the conjunctiva is rare and usually secondary to nasal tuberculosis.

Tuberculosis of the cornea and sclera is exceedingly rare.

Tuberculosis of the iris and choroid occurs in a miliary or disseminated form.

Tuberculosis of the retina is very rare.

Prophylaxis and Treatment.—Hygiene and tuberculin can be suggested. When the disease is not primary surgical intervention in intraocular tuberculosis is not advisable.

Miliary Tuberculosis of the Placenta

Warthin reports a case of miliary tuberculosis of the placenta with incipient pulmonary tuberculosis of the mother becoming florid after birth of child.

This case [1] is of great importance in that it demonstrates the possibility of the transmission of tubercle bacilli to the fetus from a mother having an unrecognized latent tuberculosis of one apex.

Tuberculosis of the Mammary Gland

Tuberculosis of the mammary gland is quite rare. It is found with or without abscess formation in an unevenly indurated breast. The axillary glands are usually involved.

The differential diagnosis involves simple and syphilitic induration and malignant degeneration. Total eradication by the knife is indicated only in advanced cases.

Tubercle Bacilli in the Blood

From time to time we hear of the finding of tubercle bacilli in the blood in acute miliary tuberculosis and in various forms of chronic tuberculous infection. From these reports no deduction can be made regarding any special line of treatment.

Tubercle bacilli have been found in the *bile* in tuberculous cadavers.

Post-typhoid Tuberculosis

Typhoid fever patients should be protected from all sources of tuberculous infection on account of their susceptibility. Both diseases can coexist at any stage of either disease.

[1] Warthin, Alfred Scott (Ann Arbor, Mich.), *Jour. Amer. Med. Assn.*, vol. LXI, No. 22.

B. Syphilis

Definition and Etiology.—Whether or not this disease dates back to antiquity, or whether it first made its appearance with the return of the Spanish sailors from the new world, has not up to the present been definitely established. It is claimed that the Chinese treated lues with mercury three thousand years before the Christian era.

Syphilis is a disease caused by a specific organism called the *Spirochaeta pallida*. The parasite (protozoa) was demonstrated by Schaudinn in the year 1905. It is present in the primary sore or chancre, in the lymph nodes near the portal of entrance, in secondary lesions and gummata and in congenital lesions. Noguchi successfully cultivated the parasite found in the central nervous system in paresis.

Modes of Infection.—The majority of cases of syphilis take origin from unclean sexual contact. Primary chancres within the mouth may be due to perverted practices. Lip chancres may be innocently acquired. Wet nurses may become infected at the nipple through a luetic nursling. Relatives and nurses of a syphilitic child may be accidentally contaminated. Physicians and dentists may contract syphilis from patients and patients may be infected by unclean instruments. Children may be infected by ritual circumcision.

Articles Likely to Carry Infection.—Cigars, cigarettes and holders, pipes, toothpicks and brushes, drinking utensils, razors, shaving brushes, pins, needles, sponges, towels, communion cups, children's toys, especially those put in the mouth, fish horns, whistles, manicuring instruments, barbers' caustic sticks, etc.

Modes of Infection in Childhood.—There are various methods whereby syphilis may be innocently acquired in childhood: parturition, circumcision, vaccination, breast feeding, hand feeding, fondling, household utensils, toilet articles, unsterilized surgical, dental and electrical appliances, careless and unclean methods in caring for wounds and removal of foreign bodies, and miscellaneous sources.

Among the miscellaneous sources chancre on the buttock from contact with the mother's vulva is included. Infants poke their fingers into other people's syphilitic mouths and then into their own, or are inoculated by the mother's finger.

Congenital Transmission.—Congenital transmission is through the mother (intra-uterine—placental infection).

The Wassermann reaction in the mother, who to all appearances is healthy, proves the transmission of the disease through her and not directly through the father.

Syphilis Hereditaria Tarda.—This form of lues which has a remarkably slow evolution is transmitted through the mother.

The superiority of the experimental and laboratory method over that

of simple observation of the patient is seen in the recent downfall of Colles' so-called "law." It has long been taught, as an outcome of clinical observation that an "apparently" healthy mother of a syphilitic child will not become infected by nursing or handling her child, because in bearing a syphilitic child she has become "immune" to the disease. It is usually true that the mother under such circumstances does not become infected, but as a result of experimental work and laboratory tests, we now know that she does not become infected, not because she is "immune," but because she herself has the disease, usually in a so-called "latent" form; that is, she is only "apparently" healthy and later on will pay toll to the hidden parasites. The same is true of Profeta's so-called "law" which relates to the "apparently" healthy child of a syphilitic mother. The child is really not immune; he really has the disease and will suffer accordingly.

The Spread of Infection.—Within a few weeks after the infection, the spirochetes spread through the lymphatics into the circulation and then throughout the entire system. It is a matter of only recent knowledge that in the very first months of the disease the spirochetes invade practically every tissue in the body. We have long known it for the skin and mucosa; we know of it for the nervous system where Captain Nichols has demonstrated the spirochetes in the spinal fluid, in a case that had been infected only three months before. Once in the tissues, the organisms are probably destroyed in large numbers by the natural agencies for resisting infection, but large numbers remain and perhaps pass into a spore stage, and do no further damage until something happens to provoke them to renewed activity.

The Wassermann Reaction

As a result of the discovery of the parasite, a method of determining the presence of immune bodies (not of spirochetes) in the blood of a syphilitic has been perfected and is known as the Wassermann reaction. It appears from the end of the second to the fourth week and continues for a long time. It may be absent during active treatment and appear again later on.

The intensity of the reaction is usually proportionate to the activity of the syphilitic lesions. It is a great help after the primary stage as an index of treatment. *Noguchi's luetin reaction* is a supplement to the Wassermann reaction.

The Newark, New Jersey, Health Department has issued the following instructions regarding the Wassermann Reaction for syphilis:

A *positive* Wassermann reaction is now accepted as evidence of luetic infection and indicates the necessity of specific treatment.

A *negative* Wassermann reaction may be obtained in a large percentage of cases of active syphilis while under mercurial treatment; hence a *negative* reac-

tion would be of no clinical significance within less than six weeks after cessation of mercurial treatment.

A *negative* Wassermann reaction may be obtained in the majority of cases of active syphilis treated with salvarsan a short time after its administration; but the reaction becomes *positive* again when a cure has not been effected.

The ingestion of alcohol may cause the Wassermann reaction to become *negative* within two hours after it has been taken, and this effect may last for from twenty-four to seventy-two hours.

In Primary Syphilis (chancre) the Wassermann reaction is *negative* in about fifty per cent of the cases (and the diagnosis should be made by the presence of the Treponema pallidum). A *negative* Wassermann reaction, therefore, should not exclude syphilis in suspected primary syphilis.

In Secondary Syphilis the Wassermann reaction is *positive* in a very high percentage of cases excepting at the very beginning of this stage.

In Untreated or Insufficiently Treated Tertiary Syphilis a *positive* Wassermann reaction is obtained in the large majority of cases.

In Latent Syphilis after the third and fourth years the Wassermann reaction is *positive* in less than fifty per cent.

In Congenital Syphilis the Wassermann reaction is *positive* in the great majority of untreated cases.

Mothers of Syphilitic Infants react the same as persons with latent syphilis.

In Tabes Dorsalis the Wassermann reaction is *positive* in the majority of the cases (70 per cent).

In General Paresis the Wassermann reaction is *positive* in the great majority of cases (95 per cent).

How the Wassermann Reaction Should Be Used in the Treatment of Syphilis.—Not until an absolutely *negative* reaction has been obtained should specific therapy cease. The blood should then be tested every three months for a year, as in cases of recurrence the Wassermann reaction may become *positive* at least a month previous to any clinical manifestations of the disease. During the second year, if there have been no recurrences, it is sufficient to test the blood once in six months. A case of syphilis should not be regarded as cured, until all clinical manifestations have disappeared and the Wassermann reaction has been constantly *negative* for a period of at least two years.

Directions for Drawing Blood for the Wassermann Reaction.—Blood is most easily obtained from the median basilic vein of the elbow. The arm should be rendered aseptic by the usual method of scrubbing with soap and water and the application of a 1 to 2,000 bichlorid of mercury pack for ten minutes. After this the site of puncture should be rubbed with alcohol and then with ether. An elastic bandage is placed above the elbow, sufficiently tight to fill the vein but not tight enough to impede the arterial circulation. Sterilization of the skin by iodin is permissible and is a very good method.

Introduce the sterile needle through the skin into the vein in the direction of the axilla, and allow the blood to flow into a sterile vial. After this has been accomplished, replace the cork in the vial and let this stand at

room temperature for half an hour or longer if necessary, for the blood to clot firmly. If the specimen is to be kept for any length of time it should be placed in the ice-box until sent to the laboratory.

Dress the puncture in the skin with sterile gauze and apply a snug bandage or a bichlorid of mercury pack.

The ingestion of alcohol or the administration of an anesthetic within twenty-four hours prior to the collection of the blood specimen interferes with the accuracy of the test.

Stages of Luetic Infection.—Our newer knowledge concerning the remote effects of luetic infection may tempt the clinician to speak of a quaternary stage of lues (paresis and tabes, etc.)—the primary stage being represented by the initial induration or hard chancre with connective tissue formation and endarteritis; the secondary stage manifesting itself principally by condylomata, papules and other skin eruptions, and the tertiary stage of gummata (tumors) and dry eruptions.

The Therapeutic Test.—The ulcerative forms of syphilis and the tumorous swellings of lues on the surface of the body, as well as in the viscera and lymphatic system, demand from the clinician, as far as prognosis and therapy are concerned, a differentiation from the ulcerative and tumorous forms of malignant disease (cancer and sarcoma) and of tuberculous lesions. Inasmuch as syphilis responds to chemotherapy and not to the knife, and malignant disease is best treated in the present state of our knowledge by the timely use of the knife, and inasmuch as the differential diagnosis between the two is occasionally very difficult, it is frequently good judgment to give the patient the benefit of the doubt by instituting a course of antiluetic treatment in doubtful cases (therapeutic test) in addition to making the Wassermann test.

Clinical Course of Syphilitic Infection.—Generally speaking, syphilitic lesions, like tuberculous deposits, may be found in all tissues and organs of the human body. Syphilis of the skin or external mucosa is of minor importance. Healing takes place with scar formation. Lues of the viscera, heart, blood vessels and nerves is of very great importance.

Various Stages.—In acquired syphilis we recognize four stages or periods:

1. The initial sore or hard chancre.
2. Secondary stage (cutaneous and mucous lesions).
3. Tertiary stage (gummata and dry scales).
4. Quaternary stage (tabes—paresis).

Inherited syphilis may run a course similar to that of the acquired infection.

In syphilis hereditaria tarda we are apt to encounter tertiary manifestations.

Prognosis.—In determining the course of a given syphilis we must take into consideration:

(*a*) The intensity of infection,
(*b*) The resistance of patient,
(*c*) The kind of treatment.

In some rare cases the patient seems overwhelmed with the poison and goes under with symptoms of cachexia in a few months.

All superficial syphilides give a good prognosis as to themselves; that is, they respond to proper treatment and in many cases of syphilis of today no symptom beyond chancre and skin mucosa lesions present themselves. S. Pollitzer claims that fifteen per cent of cases as we see them eventually show tertiary lesions, but the occurrence of tertiary lesions is due largely to insufficient treatment in the early stage.

Relation of Syphilis to Marriage and Heredity.—The significance of syphilis in regard to marriage and heredity can be discussed from three main viewpoints:

1. Risk to the prospective husband.
2. Risk to the prospective wife.
3. Danger to the offspring.

Syphilis may affect the man and incapacitate him as the support and head of a family. It is a peculiarity of syphilis that its most dangerous and deadly consequences are the late manifestations. Grave lesions of important organs resulting in hemiplegia, paraplegia, general paralysis, etc., may develop in syphilis, characterized by an initial benignity. Nothing is more difficult and uncertain than forecasting the future of a given case of syphilis. In many cases valuable prognostic indications might be drawn from the earlier manifestations of the disease which pointed to the involvement of the nervous system, as for instance the localization of specific lesions in the ocular apparatus, the occurrence of iritis, paralysis of the muscles of the eye, etc.

In regard to the contamination of the wife, when the syphilis is recent and active, contamination is practically certain, but infection may occur when the husband has upon his person no contagious lesion. The risk of infection to his wife is based upon the duration of the contagious and transmissive periods. Clinical observation shows that the contagious activity of syphilis is markedly attenuated and finally extinguished by time and treatment. The time limit cannot be exactly stated, as it varies in different cases. It is usually twelve to eighteen months after the completion of the secondary stage and sufficient specific treatment. The arbitrary designation of two and one-half to three years is medically an error and socially a danger.

The prognosis of syphilis in relation to heredity is much more unfavorable when the wife is infected. The corrective influence of time upon syphilitic heredity is less marked since the hereditary influence might be manifested long after the disease had ceased to be contagious; this is especially true of maternal heredity. The preventive influence of treat-

ment upon syphilitic heredity is more marked but less permanent. If the syphilitic parent is under the active influence of mercury at the time of impregnation, a healthy child might result; but if treatment is suspended the next child might be syphilitic. After four years of treatment the transmissive qualities are practically extinguished.

At present the problem is not yet solved as to who will become tabetic or paralytic and who not. We have four tests which have been contributed by experimental and laboratory work for the detection of the disease. These tests cannot safely be disregarded in determining the marriageability of persons who have had syphilis. These are as follows: (1) a series of Wassermann reactions; (2) the provocative Wassermann reaction; (3) the luetin reaction of Noguchi; (4) examination of the cerebrospinal fluid. If any of these tests are positive, consent should not be given to marriage. It is evident that we cannot safely rely on a single test; we must use all the means at our disposal. We must insist on a clean bill throughout, if practical advance is to be made in eugenics.

Under What Circumstances Are Syphilitics to Be Accepted as Insurance Risks?—The risk of one infected with syphilis is far greater than that of a healthy person. A subject suffering from florid syphilis should be advised to undergo radical treatment until a negative Wassermann reaction is reached. He may then be accepted and remain for three years (in more advanced cases two years) under control.

Should an applicant confess syphilis—not of florid type—he is to be studied with the Wassermann test. Should this be negative the risk may be unconditionally accepted, provided a "cure" has preceded the reaction.

On the other hand it would be a great mistake to imagine that syphilitics are doomed because we find evidence of a hidden infection in so many cases. We have good reason to believe that a majority of the human race have tuberculosis at some time of life and in most cases without even knowing it, and syphilis in many respects is no more serious than tuberculosis. In addition we have means of treatment, control and cure. We can control the disease even if we cannot thoroughly eradicate it in late cases. Many syphilitics do the hardest kind of physical and mental work and are fit for all the activities of a useful citizen, with the one exception of the perpetuation of the race. For this function they should be made to qualify.

Mortality in Syphilis.—Mortality rates in syphilis are inaccurate because of the disinclination to attribute death to venereal disease and because the original infection is obscured by the immediate clinical manifestations of disease of the brain, cord, heart, arteries, kidneys, liver, etc.

Many deaths from syphilis appear in the records as stillbirths, locomotor ataxia, paresis, arteriosclerosis and aneurism, chronic kidney disease and chronic liver disease. The statistics of the New York Health Board show a mortality for syphilis of one death in 10,000 living. For

the United States the official figures show a mortality of one in eighty deaths.

Remarks on the Clinical Forms of Acquired and Inherited Syphilis

The Cutaneous Manifestations of Syphilis

Syphilodermata constitute about ten per cent of all skin lesions and they are frequently the main symptom for which the patient seeks advice.

Fig. 86.—Syphilitic Ulcer of the Hand, of Four Months' Duration. Patient a male aged thirty-seven years. (After Foote, "Minor Surgery.")

As a rule syphilitic skin lesions do not itch unless scabies, urticaria, eczema or pediculosis are present at the same time. Moist papules about the genito-anal region are also apt to itch. Multiformity of lesion is a special feature of skin syphilis and several types of eruptions, such as macules, papules, pustules, crust and scaly eruptions may be present on the same subject. The color of the eruption or scar is usually brownish. The sites of predilection are the squamous syphiloderm of the palms and soles, papules—as angle of mouth or nasolabial folds or forehead—and moist papules or flat condylomata about the genito-anal region. In tertiary manifestations we find irregular grouping of skin lesions. The pustular syphilide frequently resembles the variola pustule. The greenish brown color of the scab taken together with the history of the case and an examination of the genitals and coexistence of other symptoms will usually lead to a correct diagnosis. The tubercular or nodular syphilide is dull

red and apt to form patches as the ulceration at the margin. Luetic ulcers are found mostly upon the leg. Gummata of the skin are tertiary lesions.

Nose, Throat and Lung Syphilis

Nose and throat syphilis is not as pronounced today as it was formerly, owing to improved oral hygiene and improved treatment. Primary lues of the mouth, tonsil, lips, tongue or nasal septum are not common, but secondary lesions of the pharynx—mucous patches—are common. They look like burns of the second degree. Such lesions are localized. If a pharynx is red all over we need not as a rule suspect lues. Luetic and tuberculous ulcers may coexist in the same person. Vincent's ulcer may be taken for lues.

Syphilitic Coryza.—Syphilitic coryza is one of the earliest and most frequent symptoms of congenital syphilis. The coryza may appear in two or three days after birth, but usually in the second or third week of life. It is noticed first from the difficulty in nursing and respiration, before the discharge appears, because the affection occurs first in the post-nasal space, and the discharge runs down the throat. After a week it advances to the anterior nasal tissues and there is a seropurulent discharge, fetid and mixed with blood, running over the upper lip and excoriating it, as well as the lower lip and the chin. Black scabs and red fissures in the skin appear over the scarlet skin. When the child sits up it can breathe, but as soon as it lies down it strangles, becomes purple in the face and nearly suffocates; sleep is impossible and suckling almost so. There is often spasmodic cough and vomiting or dysphagia. Diarrhea and asthenia soon are added.

The accessory sinuses are more often affected with syphilis than we suspect. The snuffles of infancy is a catarrhal rhinitis often looked upon as syphilitic.

Laryngeal Syphilis.—Laryngeal syphilis is usually a secondary condition to pharyngeal lues and rarely an ulcerative lesion.

Tertiary forms of lues are not much observed in the nose and throat in our day on account of the energetic treatment which is given in good time.

Syphilis of the Lung.—Syphilis of the lung is occasionally met with. It gives symptoms and signs similar to those of tuberculous infection and responds to antisyphilitic treatment.

Case of Tertiary Syphilis Which Resembles, in its Course and Symptoms, Phthisis Pulmonalis[1]

The patient, a man, age forty-six, denied the presence of syphilis. Had frequent attacks of grippe, and since the last attack of grippe has not been well. His appetite failed and he lost from seventy-five to eighty

[1] Fischel, *Med. Fortnightly.*

pounds. Complained of pains in chest and slight cough and night sweats. A tentative diagnosis of phthisis was made, though no tubercle bacilli were found; there were no very pronounced physical signs of the disease. He ran a temperature of about 100 degrees with rapid pulse, and complained of feeling chilly. Expectoration was mucopurulent. Upon the patient finally confessing that he probably had an initial lesion some years previously, he was put upon a mixed treatment which eventually brought his condition to a normal status of health. This case is of unusual interest on account of the rarity of the condition.

Lues of the Gastro-Intestinal Tract

Primary and secondary sores are found in mouth, tongue or rectum. Luetic parotitis is an occasional secondary manifestation. During the second stage we may have symptoms of gastro-enteric irritation such as accompany any general infection.

Gastralgia and intermittent attacks of vomiting or pain may be due to syphilis of the central nervous system (tabes dorsalis). Such cases are diagnosed as ulcers and found upon the operating table. A study of the reflexes (eye, knee jerk) and of the blood reaction should insure against mistakes in diagnosis.

Syphilis of the Stomach.—Syphilis of the stomach may be ulcerative, diffusely sclerotic or gummatous. In cases reported which proved to be syphilitic, pain, vomiting and belching of gas and emaciation were the principal symptoms but no tumor or area of tenderness were in evidence. Lues is very prone to attack the pylorus and be confounded with simple ulcer and may end in cicatricial stenosis of the pylorus.

Functional gastric disturbances may be a part of the general systemic disorder in syphilitic infection and they may be secondary to syphilitic cirrhosis of the liver.

Syphilides may manifest themselves in any part of the *intestine* and symptoms of irritation may progress to symptoms of stenosis of the gut.

Ulcers and gummata of the rectum may be mistaken for cancer.

Syphilis of the Liver.—Syphilis of the liver may manifest itself as hepatitis with or without jaundice and end as cirrhosis. In other instances gummata are in evidence and can be felt through the abdominal wall. In late hereditary syphilis a diffuse hypertrophic cirrhosis has been described by the writer. The late visceral manifestations of syphilis are well known to be refractory to treatment.

Acute yellow atrophy of the liver in a luetic subject has been reported. The validity of the therapeutic test can find its best illustration in this class of cases and the practitioner should bear in mind the possibility of gastric cases being of luetic origin and make a trial of the iodids in saturated solution.

Syphilis of the Gall-bladder and Bile Ducts.—Syphilis of the gall-bladder and bile ducts is comparatively rare. The inflammation may be hereditary; may attack the common duct early in the course of the secondary period of syphilis or this may happen later in the secondary period; or it may occur in the tertiary period.

Anomalies and malformations of the gall-bladder and ducts are frequently present in syphilitic infants. The clinical picture of hepatic lues is that of a syphilitic having discomfort and tenderness over the liver area with some fever and jaundice. The liver may or may not be palpably enlarged. The gall-bladder is usually not enlarged but there may exist tenderness in the gall-bladder region. An eruption may or may not be present. The pain is not the severe pain of gall-stone disease nor is the tenderness exquisite; consequently rigidity is not marked. The condition is readily amenable to specific treatment.

Syphilitic Pancreatitis.—Syphilitic pancreatitis presents no very distinct clinical picture.

Syphilis of the Rectum.—Syphilis of the rectum may be inherited or acquired and show primary, secondary or tertiary lesions. Hereditary syphilis finds expression about the rectum usually as a secondary lesion in the form of an *erythema* around the anus with numerous small fissures. In acquired syphilitic conditions, secondary lesions occur in the anus as on other mucous membranes. *Condylomata* are common and should be removed with scissors or cautery. *Gummata* of the anus are rare, but are common in the rectum. They occur as localized smooth, round, painless deposits in the submucous tissues. They respond very readily to antisyphilitic treatment. The most common of the tertiary lesions are proliferating *proctitis, ulcerations* and *strictures.* The treatment is as efficacious as is antisyphilitic treatment in any part of the body, except when strictures have formed. These are most resistant to treatment of all kinds and the possibility of their occurrence should always be borne in mind in the treatment of rectal ulcerations—particularly in those cases giving a history of syphilis.

Syphilis of the Heart and Blood Vessels

The most frequent, constant and early symptom of cardiac involvement is dyspnea and pain behind the manubrium sterni and tenderness on pressure. Cyanosis is present in fifty per cent of cases and insomnia is pronounced; all the serious symptoms (arrhythmia and dilatation) arise from the involvement of the heart muscle and not the endocardium.

Heart syphilis usually gives the clinical signs of myocarditis. Apparently strong individuals become weak.

Influence of Hereditary Syphilis on the Heart.—De Chiara [1] insists

[1] De Chiara, *Rivista di Clinica Pediatrica,* Jan., 1906.

on the importance of the infective factor as a cause of the maladies of the heart in congenital cases. Such factors are *rheumatism and hereditary syphilis*. He describes a family in which one child showed the typical symptoms of mitral stenosis. The father was affected with syphilis, and there were luetic manifestations in all the members of the family. In the child described there had never been any other sort of infection up to the time when she was examined, which was at the age of twelve years. One year after the heart symptoms were recognized the child had chorea, and a year later she died suddenly. The author believes the heart lesion to have been the result of hereditary syphilis, since it appeared before the chorea. He advocates mercurial treatment of the pregnant mother throughout pregnancy in cases in which the father is syphilitic as a prophylactic measure to be used for the benefit of the child.

As regards treatment we may state that cases of heart involvement in early syphilis may be fully cured irrespective of the character of the lesion by vigorous specific treatment alone and independent of circulatory measures.

Aortitis and Syphilis.—Degenerative and productive changes in the aorta with resulting aneurisms or aortic insufficiency have long been recognized.

Chiari reported that of 27 cases of undoubted syphilis examined post mortem aortitis was present in 16, and of 44 paralytics 21 showed aortitis, indicating that more than one-half of all syphilitics coming to autopsy show characteristic lesions in the aorta. Similar results have been obtained by clinical observation. In von Strümpell's report of 24 cases, tabes and aortic lesions, chiefly aortic insufficiency, coexisted in 15.

As the Wassermann test seems to have distinct value in indicating the activity of syphilitic lesions, there would seem to be an excellent opportunity for therapeutic advance in the treatment of aortic regurgitation when of syphilitic origin, as most of the uncomplicated cases are shown to be.

In luetic aortitis pain and dyspnea are the principal symptoms. The attacks of paroxysmal dyspnea are very distressing. The patient is cyanotic and his blood pressure goes up to 200 systolic. Large doses of salvarsan in such cases are attended with danger and have been followed by death.

Huebner's Peri-arteritis of Cerebral Vessels.—This is responsible for a multiform picture of cerebral syphilis. Very satisfactory results have been observed from specific treatment in children suffering from recurrent and frequent convulsive seizures due to cerebral lues.

Syphilitic Phlebitis.—Syphilitic phlebitis is often noticed at an early stage of the affection, and patients are obliged to remain in bed on account of malaise, fever and pain.

Syphilis of the Genito-Urinary Organs

The primary lesion in syphilis, the indurated chancre, is usually found on the external genital organs of both sexes. In the male the primary lesions may be complicated by phimosis or obscured by an elongated foreskin.

Luetic induration of the *scrotum, testicle, spermatic duct, ureters,* and *kidneys* is observed, and in the female the external and deep generative organs may participate likewise.

Syphilis of the Pelvis of the Kidney.—Syphilis of the pelvis of the kidney as the only manifestation of florid syphilis is a very rare occurrence. Dr. Gottlieb demonstrated a case of this condition in which there existed a mere catarrh of the bladder and a pyelitis, but nothing else indicated syphilis except a positive Wassermann reaction. The pyelitis and cystitis fully subsided after six injections of salicylate of mercury.

Syphilis of the Central Nervous System

Statistics show that cases of syphilis of the central nervous system appear usually within the first three years after infection. The peripheral nerves do not participate largely in the pathological process unless there are predisposing causes such as alcoholism, worry, overwork, etc.

Pathologically speaking we recognize in the central nervous system:

1. Specific arteritis.
2. Specific meningitis with infiltration of the cranial nerves.
3. Gummata.

Clinically this differentiation is without practical value as the treatment is the same in all.

Symptoms of Brain Syphilis.—The symptoms of brain syphilis enumerated in the order of their frequency and diagnostic importance are:

1. Headache.
2. Mental irritability, alteration of personality, explosiveness, depression, inadequacy.
3. Cranial nerve disorder, particularly the third, eighth, second, fifth and seventh.
4. Insomnia.
5. Disorder of motor function, shivering attacks, stiffness, convulsion, paralysis, dysarthria, aphasia.

Prognosis of Cerebrospinal Lues.—Dr. M. Allen Starr states regarding the outlook for cerebrospinal lues:

> In determining the prognosis of these various lesions one should sharply note the difference between the effects of gummata and the effects of arterial disease. The prognosis in gumma exudations within the brain and meninges, or the base of the brain, or in or around the spinal cord, he believed to be a fairly good one,

and he reported cases which entirely recovered under the employment of antisyphilitic treatment. There were many instances of recovery from very serious lesions when the lesions were in the nature of a gumma. But when syphilitic disease was located in the blood vessels it was different; here the prognosis was made not on the mere accident that syphilis was the cause of the endocarditis, but upon the fact that such cases of endocarditis lead to an obliteration and cutting off of the blood supply and the formation of thrombi in the vessels; in such cases it made no difference whether the condition was syphilitic in origin or not. The importance of recognizing the element of syphilis in the production of functional nervous diseases should be borne in mind; also in the causation of certain forms of epilepsy, especially those forms that develop after the age of 35 or 40; here the epilepsy might be traced to some form of syphilis of the brain, such as gumma, or infiltration, or arterial disease. Therefore, in such cases, the bromid treatment should have combined with it mercury and the iodids.

Cerebral syphilis plays an important part in the production of mental disease. The mental symptoms consist of confusion, delirium, amnesia, hallucinations, retention defect, and a poor memory for recent events. In addition there is relatively little disintegration of the personality. Syphilitic psychoses respond favorably to a combined mercurial and salvarsan treatment. Potassium iodid acts simply as an eliminative agent, and has no specific action on the Spirochaeta pallida. The only safe treatment is prophylaxis.

Late Manifestations of Lues of the Central Nervous System.—The late manifestations of lues of the central nervous system are mainly illustrated by paresis and tabes. A large proportion of feeble-minded, epileptic and retarded individuals are victims of hereditary syphilis. Practically 95 per cent of cerebrospinal cases show the Argyll-Robertson phenomenon.

The nervous system is refractory to treatment and only early and energetic antiluetic treatment will bring satisfactory results.

The following general considerations [1] may be of aid to the practitioner in coming to a conclusion:

1. The brain affections of early syphilis are most frequent in the first year after infection, and next most frequent in the second year; 50 per cent of all cases occur in the first three years; it is most commonly a specific endarteritis, and next most often a syphilitic meningitis with specific infiltration of the cranial nerves, gumma being the least frequent.

2. The paralyses of early brain syphilis, with the exception of those of the cranial nerves, are oftenest due to thrombosis from arteritis, hemorrhage or gumma being rarer. In the very earliest stages the effects of treatment may be brilliant; but when fully developed the lesions are not more amenable to treatment than are similar changes due to ordinary arteriosclerosis or atheroma.

3. Lack of type is a marked symptom of early brain syphilis, so that any case presenting an odd mixture of somatic and psychic symptoms, or a bizarre appearance on disappearance of them, may be regarded as suspicious. Insomnia, somnolence, or alterations of them; pain or anesthesia; spasm, paralysis, or both; monoplegia, paraplegia, hemiplegia, crossed paralysis, single or multiple

[1] Gottheil, *Specialist and Practitioner.*

cranial nerve paralysis, give a hodge-podge of symptoms and partial manifestations.

4. Headache is present in 75 per cent of the cases; its locality is unimportant; it is usually nocturnal, but it may be vesperal, or even markedly diurnal.

5. Sudden attacks of various kinds are common, and their transient appearance is characteristic. Every sort of fit, from the mildest to the most tumultuous, occurs. There may be dizziness, syncope, momentary unconsciousness simulating petit mal, localized numbness or tingling, spasms, or apoplectiform or epileptiform convulsions.

6. Cranial nerve paralyses are frequent and striking phenomena in early brain syphilis, the eye nerves being most frequently affected; the immense majority of ocular paralyses are syphilitic. A typical change in the visual field, sudden blindness without changes in the fundus, paresthesiae or pain in the distribution of the fifth nerve.

Syphilitic Exudations into the Meninges.—These exudations are likely to occur in the lowest portions of the cranial cavity or at places of least resistance, as at the base of the brain, at the crura, at the sides of the pons, or in the medulla. The disease may affect the cranial nerves. It occurs in from one to two years after the chancre, or it may occur later. The exudation may gather in a short time, so that the symptoms may develop rapidly.

The cortex may be covered by this exudate, creating localized spasms, hallucinations, and supersensitiveness to light (photophobia). These irritation symptoms may be followed by paralysis. There are also headache (which is worse at night), insomnia, irritability of temper, dullness (especially in the morning), restlessness, vertigo, fullness of the head, throbbing in the head, and vomiting, which is sometimes projectile and has no relation to the ingestion of food.

As to the localization of the exudate, there may be involvements of the cranial nerves, especially the third, sixth, seventh, and eighth. The fifth is less frequently involved. There may be optic neuritis, aphasia, convulsions, apoplexy, increased thirst and hunger from disturbance of the frontal lobes, polyuria, etc. The symptoms, in fact, may be those of a tumor of the brain, and we can distinguish them sometimes only by the greater rapidity of development of symptoms in syphilitic cases. Antisyphilitic treatment will surely show the difference.

General Paresis.—General paresis under certain aspects resembles brain tumor. The Wassermann reaction and Noguchi's discovery of spirochetes in the brain have established paresis on a syphilitic foundation.

Avoidance of and prompt treatment of luetic infection is the only preventive effort possible.

The intraspinal administration of salvarsanized blood serum which is described in this chapter is a new form of treatment available at the present time which gives no better results than intravenous treatment.

Spinal Syphilis.—There may be the same pathological changes here as

in the cerebrum, such as gummata attached to the meninges, arteritis with secondary softening, meningitis with secondary cord changes, or sclerosis developing late in the disease.

The *symptoms* are extremely varied.

Cerebrospinal Syphilis.—Cerebrospinal syphilis gives rise to the symptoms of both brain and cord disease.

Syphilis of the Peripheral Nerves.—It is quite rare that syphilis attacks the peripheral nerves, but we occasionally see cases of nerve irritation and compression due to a syphilitic exudate. There is said to be a form of multiple neuritis produced by syphilis. In cerebral and spinal syphilis the nerve roots may be attacked, causing a radical neuritis.

Tabes dorsalis is discussed in Section XII.

Cerebral Syphilis in Childhood.—This form of syphilis manifests itself singly or in combination as meningitis, arteritis, and syphilomata.

These clinical phenomena are multiform—acute or subacute. They are likely to disappear and recur but respond promptly to specific treatment. Headache is frequently an early symptom in childhood, or motor phenomena may dominate the scene: epileptiform convulsions, general or unilateral; monospasms may occur; tremors; involuntary irregular movements without loss of consciousness; motor aphasias; paralytic conditions of any degree of severity or extent.

The ocular palsies, so frequent and conspicuous, belong to the instances in which the involvement of the cranial nerves is a prominent feature of the case, also inequality and fixation of the pupils.

Sensory phenomena; neuralgic pain, numbness, anesthesia and various paresthesic phenomena may prevail for a considerable time, especially in the early stages of the disease, while the background of other symptoms is still indefinite and vague. In other cases the psychical features, changes in character, irritability, apathy, depression, impairment of memory, diminution of mental capacity, dementia, and very rarely mania, may either usher in or close the scene, or remain throughout the essentially predominant manifestation of the central process.

Eye Syphilis

Syphilitic Optic Neuritis is very rare as an independent lesion.

Iritis, choroiditis and retinitis of luetic origin are clinical features of comparative frequency.

Interstitial keratitis is not rare.

Ear Syphilis

Impaired hearing is sometimes due to syphilis.

Lues and Exophthalmic Goiter

These conditions have been observed and cured by antiluetic management.

Syphilis and Pronounced Anemia

Syphilis and pronounced anemia are occasionally observed. Mercury must be given with caution in such cases to prevent cachexia.

Syphilitic Alopecia

H. G. Klotz[1] summarizes his conceptions of this variety of alopecia as follows:

Loss of the hair is not a common symptom of the early stages of syphilis; the physiological loss of hair must be taken into consideration before attributing it to syphilis, the same rule applies to seborrhea which is common in many scalps; in a certain number of cases loss of the hair may be very profuse, similar to that observed after infective diseases, and if there is no local change in the skin the alopecia is probably the result of malnutrition of the hair from the syphilitic infection, therefore this alopecia is not strictly a symptom of syphilis directly due to the virus, but rather a complication.

This loss of hair is directly dependent upon and proportionate to the general symptoms which accompany the second stage, and usually makes its appearance several weeks after the beginning of the disease.

Although the loss of hair may be very extensive it is not permanent unless the person is advanced in age.

There is another variety of alopecia that occasionally occurs in the form of ill-defined, irregular, small patches of baldness, distributed over the back and upper portions of the scalp. This small patch alopecia is observed almost exclusively in syphilitics and is so characteristic that it is diagnostic of syphilis, and it almost always occurs at a period more or less remote from the time of the infection, usually not before the end of the first year and up to the end of the second year. It runs a tedious course, although it terminates in the restoration of the hair. It is very difficult to explain the origin of this alopecia.

Syphilis of the Joints, Bones and Periosteum

Acute arthritis in congenital syphilis, as well as in that of the acquired syphilis, is occasionally looked upon and treated as "simple rheumatism"—the more so since such lesions are inclined to be polyarticular. We observe arthritis, arthralgia, synovitis, epiphysitis, gummatous synovitis, osteitis and deforming arthritis in both syphilitic and tuberculous individuals.

A syphilitic joint disease does not show any clinical difference from a joint lesion due to some other cause, and unless the physician thinks of lues the case may go on without proper treatment. Nocturnal exacerbation of pain is a strong indication of the true etiology, and the therapeutic and blood tests will confirm the suspicion.

[1] Klotz, H. G., *Jour. Cut. Dis.*, March, 1907.

Gummatous Synovitis in a Child Simulating Rheumatoid Arthritis.—Findlay and Riddell[1] give particulars of a child aged nine years with definite congenital syphilitic history. She had Hutchinsonian teeth, interstitial keratitis, and showed marked deafness. Both knee joints were swollen, the left more so than the right. On the left side part of the thickening seemed to be bony, but part was synovial. Slight creaking was detected when the knees were flexed. Both elbow joints also were considerably swollen, as were also the wrist joints, while movement of the latter was much restricted. The metacarpophalangeal joints of the thumb and index finger of the right hand were distinctly thickened, while the swollen joint in the thumb conveys a vague feeling of fluctuation. There was some enlargement of the cervical glands, and the spleen slightly enlarged. She had been treated by means of syr. ferri iod. without much benefit. She was then put under treatment by means of the high-frequency current for half an hour three times a week. The swelling and pains became greatly alleviated. The case was at first thought to be one of rheumatoid arthritis, but skiagrams showed that there were no changes in the bones or cartilages. We have here, therefore, an example of unusually widespread symmetrical synovitis of syphilitic origin, accompanied by effusion. It is interesting to note the improvement resulting from the use of the high-frequency current, combined with the internal administration of mercury and the comparative inefficacy of potassium iodid.

The osseous changes common to hereditary syphilis are most frequently manifested in the form of a diaphyso-epiphyseal lesion, that is, an osteochondritis of the femur, humerus, tibia, radius or ulna. This manifestation, when associated with other signs of congenital lues admits, as a rule, of a ready diagnosis, but when present as an initial symptom, so to say, it renders a diagnosis not only very difficult, but at times impossible, for some period.

Syphilitic Pseudoparalysis.—Cases of syphilitic pseudoparalysis with false point of motion and crepitation are on record in which immobilization and antisyphilitic measures effected a rapid cure.

Syphilitic Tumors of the Breast

The breast is a not infrequent location for early specific lesions. The primary sore, mucous patches, condylomata, and the early eruptions, may occur upon the nipple and its neighborhood.

Gummata of the breast are to be differentiated from cysts in the organ, from tuberculous disease of the breast, and from malignancy. Other tumors of this region are as a rule easily eliminated in the diagnosis.

Cysts, or chronic cystic mastitis, consist of individual nodules or cysts in the breast substance, which fluctuate and are not adherent; there is no

[1] Findlay and Riddell, *Glasgow Med. Jour.*, Jan., 1906.

reddening of the skin when uncomplicated; the nipples, if retracted, are only slightly so. Frequently fluid can be squeezed out of the nipple. The number of fluctuating insensitive tumors, the smooth breast surface with the sensation of a bag of marbles at times, together with absence of glandular enlargement in the axilla, determine the diagnosis.

In doubtful cases operative treatment should not be advised until the therapeutic and blood tests have positively ruled out lues.

Syphilitic Toxemia

In this form there may be the general symptoms of neurasthenia, with insomnia and headache. The latter is worse at night. In ordinary neurasthenia the patient feels worse in the morning. In the cases due to a poisoning with syphilis the patient feels worse at night.

Fever in Syphilis

The pyrexia of syphilitic fever is due to a hypervirulent infection upon a medium that is unable to combat the infecting protozoa, because of a loss of that immunity which had been transmitted or acquired. Fever is frequently observed in the secondary stage of syphilis. Its occurrence in the tertiary stage (visceral syphilis) is not so well-known and may cause difficulty in diagnosis inasmuch as night sweats, loss of weight and pain in the chest often occur and the disease is liable to be mistaken for tuberculosis or malaria and even typhoid fever or septicemia. When fever is due to lues it subsides in due time, following antisyphilitic treatment.

Fever in syphilis at the time of the cutaneous eruption in cases of recent lues is frequently observed. The fever curve is irregular and presents nothing characteristic. Syphilitic fever has been mistaken for typhoid fever and for septicemia.

Intermittent fever in visceral syphilis is not infrequent, notably when there is hepatic involvement.

Syphilis and Phthisis

The supervention of syphilis upon existing phthisis adds to the gravity of the latter.

A phthisical subject may contract syphilis.

A recent or old syphilitic may contract tuberculosis.

Ricord has said: "Syphilis is a blow to the economy, capable of arousing organic defects and of awakening to activity every diathesis."

Syphilis in Childhood

The number of cases of acquired lues in children is insignificant in comparison to inherited syphilis. The clinical manifestations are present

at birth or after, or, as in the case of retarded lues, at any remote period of life. The fetus may die in the womb or may be aborted in a macerated state (33 per cent of cases).

Symptomatology.—In the symposium on lues, before the meeting of the American Society for Sanitary and Moral Prophylaxis, a very lucid clinical description of the symptomatology of syphilis in children was presented by Ludwig Weiss, M.D., of New York, as follows:

FAMILIAR TYPES OF INHERITED LUES IN CHILDHOOD

1. Puny child with respiratory embarrassment and desquamation at the palm and soles.

2. Newborn infants showing a bulbous skin eruption (pemphigus syphiliticus) localized on hands and feet or over whole body.

3. Tissues around the lips and nose, instead of blebs, the skin shows papules, particularly around the nates with marked desquamation on palms and soles. The children acquire snuffles, look withered, the skull bones gape, the child whimpers and whines.

Twenty-five per cent of these three forms are due within a few weeks.

4. Frail and delicate infants showing myotony of the newborn as evidenced by spasmodic contraction of the flexor muscles, knees, elbows, toes, hands are flexed. These children are apt to die suddenly, and if they live they respond to antiluetic treatment.

5. Children fairly well nourished with but faint visible signs of lues and in which cases the diagnosis is made positive by a positive Wassermann.

6. Children with tardy inherited lues who show a sallow complexion and *chronic indigestion,* a net of veins visible on the head and temples, with overdistention of some parts of the skull wide open, frontal fontanel under tension (hydrocephalus), with phalanges (dactylitis syphiliticus). When the epiphyses are involved there is marked motor insufficiency (pseudoparalysis). The epitrochlear glands are frequently enlarged. The inner organs are usually affected, particularly the liver, and jaundice is often in evidence. The teeth are chalky and notched (Hutchinson's teeth), the nose is broad and flat at the bridge (Mongolian type), they are backward in school and deafmutism is not unusual. Many cases of epilepsy, progressive paralysis, moral and criminal insanity, imbecility and idiocy can be traced to syphilitic children born without a visible blemish in whom various characteristic symptoms develop in 4 to 6 weeks.

Prophylaxis in Syphilis

Hunger and love are the dominant forces that rule the world and the sexual appetite is a natural instinct in all healthy individuals of both sexes. Prostitution enables the female to gratify the sexual appetite and to earn money and enables the male to cohabit without assuming the responsibilities of marriage. This institution, which is the hotbed for venereal diseases, will always remain a factor in the march of humanity through the ages.

Only one method of procedure will avail to cope with the venereal plague. "If the medical profession will inform the laity fully and freely as to the facts in the case, the work will be in the hands of the people from that time forward. There is little doubt that they will rise to the occasion." Their own salvation can be effected only through their coöperation. Men and women must be informed that it is not safe to indulge in promiscuous sexual intercourse.

It is not within the scope of this article to discuss the public control of prostitution and the venereal plague, except to voice the author's conviction that health boards and not the police should have charge of such conditions, with power to exercise humane practical restrictions in lieu of the crude and brutal methods now in vogue against unfortunate and usually mentally deficient women, who are more the product of man's unjust social laws than naturally depraved.

Prostitutes must be segregated and frequently examined and if the disease has developed, isolated and given medical care. They should be taught how to protect themselves by examining the male before intercourse and they should be given an opportunity to give up their mode of life and urged to enter a new and proper field. A knowledge of the dangers of impure sexual relations should be conveyed to the young of both sexes by parent, physician and pedagogue, at the proper time. Men and women knowingly suffering from venereal diseases and infecting others should be punished by law.

Marriage should not be contracted until four full years have elapsed after the date of infection—during which time prolonged and thorough treatment must be carried out under the guidance of the Wassermann test.

Personal Prophylaxis.—Personal prophylaxis consists in:

1. Continence (personal purity).
2. Wearing a condom during intercourse.
3. Using a disinfecting preparation before and after coitus.

From reports of army and navy surgeons in this and other countries an excellent protecting measure for men is the local thorough application of lanolin, holding 30 per cent calomel, following coitus and after the penis has been washed with soap and water and has been dried.

From a report by Major William Lyster, Medical Corps, U. S. A., a "K" package now on the market devised by him and issued to the troops has given excellent results.

"K" Package.—The packet devised at the post consisted of a piece of glass tubing the size of a round lead pencil, about two inches in length; one end tapering in a perforated cone—the whole resembling a small penis syringe without any plunger. It contained three 1-10 gr. pot. permanganate tablets and a gelatin capsule filled with 30 per cent calomel ointment, all held in place by a pledget of cotton.

Directions.—To prevent disease.—Always urinate at once after

withdrawing at end of connection. Pull cotton out of glass tube. Shake out tablets and capsule.

To guard against clap.—Hold glass tube in right hand, point downward and on thumb; fill nearly full with water (hot or cold) and drop in one tablet. Place second finger over top and shake until tablet is dissolved; holding the penis in left hand, end slightly open, pointing downward, place point of glass tube into penis, the thumb being removed; holding tube in 3 fingers bring tube and penis up and removing second finger from top of tube the fluid will run into the penis; hold so a moment.

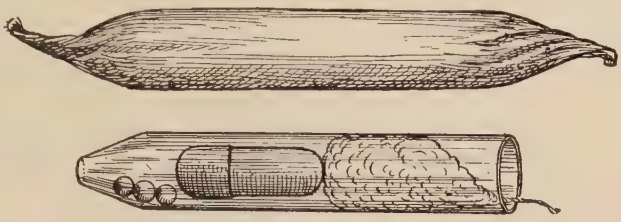


Fig. 87.—Safety Package.

To guard against syphilis and sores.—Pull apart capsule pressing out contents and rub in gently but thoroughly over entire penis, especially over head.

The Neisser-Seibert Lues Prophylactic.—A fat free ointment for inunction after coitus or other possible exposure to syphilis. The only bactericidal substance is mercuric chlorid, the other ingredients comprising starch, tragacanth, gelatin, alcohol, glycerin and water.

Take tragacanth pulv., 2, glycerin, 27, and mix. Then add gradually, warming, sodium chlorate, 1, amylum, 4, gelatin, 0,7, distilled water, 50. Under continued stirring, and allowing the mass to cool, add sublimate, 0,3, dissolved in alcohol, 15, and finally add enough distilled water to make 100 grams of ointment.

Should a suspicious genital lesion appear the galvanocautery or excision can be used and the parts dressed with the aforementioned calomel ointment.

Marital Prophylaxis.—During the infective stages of the disease marital intercourse is forbidden for a period of one year, and when resumed a condom should be worn. If conception has taken place a prophylactic course of treatment should be given to the prospective mother.

Treatment of Syphilis

The Abortive Treatment

With our present means of early recognition of the luetic primary sore (microscopic detection of the infecting agent and blood serum test) we are justified in proposing a *chancre excision* which was formerly considered a useless and harmful procedure. By excising the primary sore and

giving early specific treatment we may possibly abort the disease or at any rate lessen the intensity of the infection.

This trivial operation can be performed without pain or loss of blood by means of local anesthesia and compression followed by suturing and a bichlorid wet dressing. If performed aseptically the sutures can be removed after five days. Chancre excision should be followed by an intravenous injection of salvarsan or by mercury inunctions.

Specific Medication

Chemotherapy in Syphilis

Mercury, iodin, and *arsenic* in various combinations are the drugs used to combat syphilis. The latest addition to chemotherapy for syphilis is *arsenobenzol.*

Mercury by Inunction in Syphilis.—Mercury is most effective when given by inunction because it is absorbed directly by the lymphatics, comes into direct contact with the virus and spares the gastro-enteric tract.

Enlarged glands will yield to inunction after resisting every other treatment. Lesions of blood vessels and viscera, of bones and of the nervous system follow the lymphadenitis. Enlarged glands are found early in the disease and they may be palpated when every other symptom has disappeared. They contain the virus and a late secondary infection may be explained originating from them when the resisting power of the organism is lowered. Deep-seated glands cannot be inspected and it is therefore impossible to say when a patient is cured.

To get the desired results mercurial ointment is massaged into the skin by hand or by means of the vibrating machine. One dram of the ointment is applied daily. After the sixth inunction the patient takes a hot bath and gets the seventh dose on the eighth day and so on until thirty to forty treatments have been given. By using in rotation various parts of the body devoid of hair, undue irritation of any one part is avoided. If the patient practices inunction personally the naked hand can be used. A nurse or attendant should use the hand protected by a rubber or leather glove or a pad may be employed.

If after a course of inunctions the Wassermann reaction is negative the treatment may be discontinued for two to three months and mercury by injection or by mouth may be administered, as elsewhere described.

Mercury by Mouth.—Mercury can be given by mouth in the form of gray powder:

Hg. cum creta..... gr. 1. 4 times a day
Hg. bichlorid..... gr. 1/16 to 1/18 3 times day
Hg. biniodid..... gr. 1/16 3 times day in pill form
Hg. protiodid (green)..... gr. ¼ 3 times day in pill form

The biniodid may also be given in a saturated solution of potassium iodid in which it readily dissolves. Its administration may be continued for many weeks or until salivation is noticeable.

Mercury by Intramuscular Injections.—If a soluble mercury salt is injected the drug is thrown into the circulation at once and its therapeutic action is immediately secured. By this method daily injections are required. The injections are painful and liable to cause stomatitis and diarrhea. An insoluble preparation (suspension in oil) is slowly absorbed and by reason of its sustained action it may be given at intervals of one week; the injection is not painful. The injection method avoids direct irritation of the gastro-enteric tract, permits accurate dosage and has the advantage of convenience and secrecy, but it is not adapted to hypersensitive patients nor to children.

Formulae for soluble mercury salt therapy:

℞	Hydrarg. bichlor. cor.	gr. i	0,06
	Glycerini	3i	4,0
	Aquae pur.	5iii	12,0

Inject 5 to 15 drops.

℞	Hydrarg. benzoat.	gr. i	0,06
	Sodii chlorid.	gr. i	0,06
	Aq. pur.	3iv	16,0

Dose 5 to 10 drops.

Cacodylate of mercury can be obtained in sterile solution in glass ampules holding one dose.

In administering mercury preparations by needle, an all-glass syringe should be used and the skin sterilized by ether or tincture of iodin.

Insoluble Mercury Injections.—Salicylate of mercury emulsion 20 per cent in albolene. Dose 5 to 10 drops.

These injections are best given into the gluteal muscle. An all-glass syringe should be used with a long and not too fine needle.

Before injecting, the skin is cleansed with ether and painted with tincture of iodin. The patient may stand or lie to receive the injection. The puncture site may be covered with a small pledget of sterile cotton held in place by sterile zinc oxid plaster. Syringe and emulsion may be warmed to body temperature by immersion in warm sterile water.

Node formation of longer duration than three days is rare if the injection is gently and deeply made into the muscle. A slight oozing of blood from the puncture wound is occasionally noticed and is readily controlled by pressure with a pledget of gauze.

Injections are repeated every five to eight days or until the Wassermann reaction is negative. After an interval of two months a new course of injections may be given.

Mercury by Fumigation.—The patient sits in a chair wrapped in a blanket with the head exposed. Twenty grains (1,3) of calomel are volatilized over a flame and deposited on the patient's skin. The process lasts twenty minutes and the patient should go to bed wrapped in blankets without washing or drying the skin.

Mercury by Rectum.[1]—Excellent results are reported by Audry in the treatment of syphilis by mercury per rectum. Thirty cases of different forms of the diseases and of varying ages were treated by this method satisfactorily. Suppositories containing ,03 gram of mercury for adults and ,015 gram for children were given every night continuously for months with good results. A three and a half year old child was given a hundred suppositories on as many successive nights without ill effect. The preparation used was oleum cinereum, 40 parts, in cacao butter, 60 parts. The writer considers this method of administering mercury fully as efficient as others, except where great haste is necessary, when he would prefer injections.

Mercury by Inhalation (Kromayer).—The principle is the inhalation of the most finely divided mercury, with which a double layer of mull is impregnated, taking up about 8 grams (120 grains). The mull is fastened to a small mask worn at night, held in place by a band at each side passing over the ears, crossing at the back and tied over the forehead. This amount of mercury is sufficient for ten days, reversing the mull to get the benefit of the entire surface. The time required is about the same as for a course of inunctions, the ideal being to continue it until the serum test gives negative findings. The absence of gastro-intestinal disturbances and of pain at the point of injection are among the advantages of the method. He adds that the patient should be compelled to return for a new supply of mull each time; this will insure medical oversight of the case. Kromayer's announcement of the new method was published in the *Berliner klinische Wochenschrift,* February 24, 1908.

Mercurialized Blood Serum.—This is a recent acquisition in syphilis therapy.

Potassium Iodid or Sodium Iodid.—This is a most valuable remedy in syphilis. Under its use the secondary and tertiary symptoms of lues disappear readily. It is given in 10 to 30 grain doses, three times a day in milk, Selters water or ginger ale. It may be given in warm water per rectum, in which case the dose should be double the ordinary one. To prevent iodism a few grains of potassium chlorate are given with each dose of the iodid.

Potassium or sodium iodid can be given in combination with mercuric red iodid in solution or in pill form; also with iron.

[1] *Annal. de Dermatol. et de Syphil.,* 1906.

When iron salts are not well tolerated *iodotropon* may be given instead —one to two tablets, three times a day.

Atoxyl (Amyl Arsenate of Sodium).—Atoxyl alone or in combination with mercury is employed as a curative agent in syphilis in one grain doses. Freshly prepared solutions kept in dark bottles should be used subcutaneously. Watery solutions are employed varying in strength from 5–10–15 per cent. The dose is about 1 c.c.

Atoxyl can also be administered in tablet form; also with iron. Each tablet contains 0,05 grams atoxyl. It is given once a day and may be continued for 15 to 30 days.

It acts best in tertiary syphilis. Deep-seated gummatous processes are healed by atoxyl alone without other medication. This is given in daily subcutaneous or intramuscular injections—0,2 at a dose. The treatment is temporarily interrupted whenever symptoms of intolerance are manifest (dizziness, vomiting, fever).

Salvarsan and Neosalvarsan in the Treatment of Syphilis.—The claims of salvarsan as a complete systemic sterilizer in lues have so far not been realized; at the same time its curative influence in various infections, particularly in lues, is fairly well established despite occasional reports of toxic manifestations. Thus one group of physicians rely, principally, on salvarsan with mercury as an auxiliary treatment. Another more conservative group of syphilologists employ but one or two doses of salvarsan and follow it up by an extended course of mercurial treatment, there being no incompatibility between the various chemicals used.

However, great caution is necessary in the administration of arsenical compounds, as in certain cases toxic symptoms have arisen and there are cases on record of death, total deafness and of blindness from optic atrophy after their use.

Salvarsan is a powerful symptomatic remedy but relapses are frequent and although a final opinion as to the permanency of its action cannot be given for years to come, we may safely conclude that salvarsan alone will not cure lues any more than mercury will, but that lues can be cured by a judicious combination of mercury and arsenic.

Neosalvarsan is preferred by most physicians of large experience because it is soluble and potent. In early cases it is given several times at weekly intervals, intravenously, in 0,3 or 0,45 doses. Mercury is administered by intramuscular injection between the doses of salvarsan. Old cases require thorough Hg. salicylate and iodid treatment with an occasional injection of neosalvarsan.

Technic of Salvarsan Injections.—Place 25 to 50 c.c. of sterile water in a flask. Add one-half the amount of salvarsan to be used. Add the rest of the salvarsan and 50 to 75 c.c. of sterile water and shake until all is dissolved. Then add 15 drops of a 15 per cent sodium hydrate solution; shake well. Then continue to add the sodium solution drop by drop until

all is absolutely clear. Usually 24 drops of the sodium hydrate solution are needed.

Salvarsan Outfit.

Salvarsan set
Salvarsan needles
Sterile saline and water
Filter paper (sterile)
Sterile bottle for mixing solutions
Towels, cotton, alcohol, ether, tourniquet
Fifteen per cent sodium hydrate.

Mode of Injection.—Put on tourniquet; scrub up arm; stick vein with a salvarsan needle; remove tourniquet. Allow about 10 c.c. saline to flow into vein from flask (A). Then close stopcock (C) and allow salvarsan solution to enter the vein, the latter solution being filtered at E. After all salvarsan has entered the vein allow about 15 c.c. of saline to come through. Apply collodion and wet dressing to the arm.

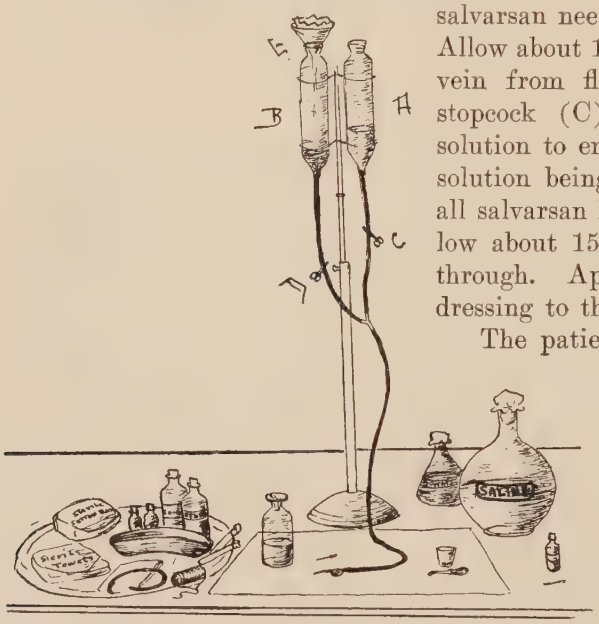


FIG. 88.—SALVARSAN OUTFIT. Salvarsan set, needles, sterile water, sterile saline, sterile filter paper, sterile bottle for mixing solution, sterile towels and cotton, gauze, alcohol, ether, tourniquet, 15 per cent. sodium hydroxid solution, collodion.

The patient is to remain in bed all day, in order to avoid chill or embolus.

Points Worth Noting. — Stripping the tube to force the last bit of salvarsan into the circulation should not be practiced. The maneuver might result in the admission of air to the vein. Also, there will be a backflow of blood into the tube, a source of danger to the next patient in case the apparatus is again to be used without resterilizing. The needle should be carefully cleansed and sterilized after each injection.

Among the causes of failure to enter the vein are:

1. A needle with a dulled point or roughened surface, or a needle that is entirely too large. The chance of failure to enter the vein increases directly with the size of the needle. However, with too small a needle the time of infusion is unduly prolonged. A needle of the proper caliber will deliver 300 c.c. of fluid in about five minutes.

2. Insufficient engorgement of the vein. With the method described above this is not a common occurrence.

3. Slipping of the vein to one side while the needle is penetrating the skin. This can be prevented by applying a short flat instrument such as a grooved director to one side of and parallel with the distended vein. The needle is then so held that in entering the vein the latter is pressed against the director and supported by it. The probability of the slipping of the vein beneath the skin may be foretold by palpating it with the finger tip. If the vein slides freely from side to side, the above or a similar precaution should be adopted. However, this expedient is rarely resorted to.

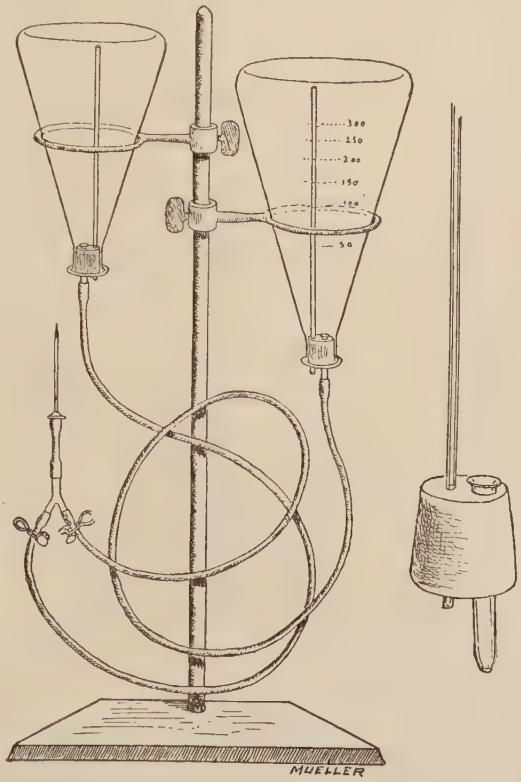


FIG. 89.—SALVARSAN APPARATUS. (Courtesy of Dr. A. Mueller, U. S. Army.)

4. As stated above, the needle while being inserted should be held nearly parallel with the skin surface. This is important. If held at too great an angle, through and through puncture easily occurs. Rarely the assistant's finger occluding the vein prevents the needle being held at the proper angle, in which case a flat instrument, such as the handle of a scalpel, should be substituted for the finger.

5. Occasionally, if, after the needle is in place, it is allowed to sag, its

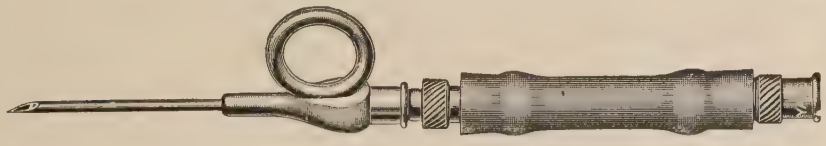


FIG. 90.—SALVARSAN NEEDLE. (Dr. Graeser, New York.) (Courtesy of Becton, Dickson Co.)

eye will be obstructed by being pressed against the under surface of the skin and the salt solution will not flow. If the finger tip is lightly placed on the vein an inch or so above the needle point, and the needle raised to a

slight angle to disengage its eye, a soft "purling" sensation will be felt as the fluid passes up the vein.

In quite a number of patients the cephalic vein along the external border of the biceps is very prominent. In these cases I have found it preferable to puncture this vein here as this portion has few or no branches along its course, is more readily controlled, and the operation at this site, two or three inches above the bend of the elbow, is far less painful. Infiltration, even with normal salt solution, at the bend of the elbow is anything but a pleasant sensation.

With reasonable care the vein can be entered successfully at the first

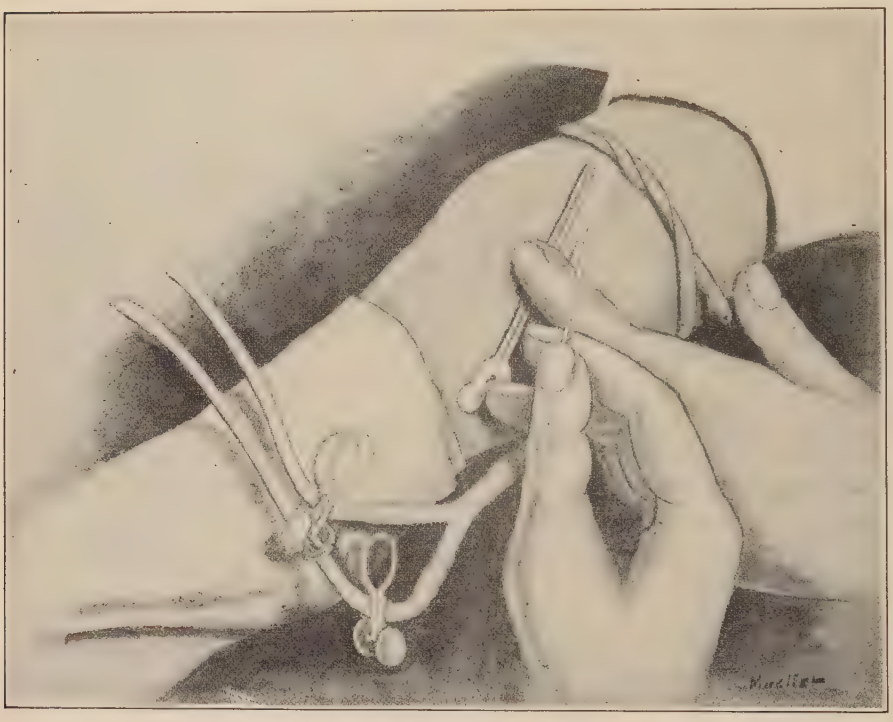


FIG. 91.—INJECTING SALVARSAN INTRAVENOUSLY. (Courtesy of Dr. A. Mueller.)

attempt in over ninety per cent of all cases. No absolute failures, with final resort to incision, need occur. Thrombosis with obliteration of the lumen at the site of puncture has not been observed.

Office Treatment of Syphilis with Neosalvarsan and Mercury.—No complicated apparatus is necessary for the administration of neosalvarsan. The dose to be given (0,3, gr. v) is dissolved in 10 c.c. of freshly distilled recently boiled water. After it has cooled it is slowly injected by means of an all-glass syringe into a vein at the elbow, under aseptic precautions, after which the patient is advised to return home and rest for the balance of the day.

After eight days a second dose (7½ grs., 0,5 gm.) is administered in the same way. Two weeks later a third dose (7½ grs., 0,5 gm.) and again two weeks later a final fourth dose (0,6, gr. x). Between the salvarsan injections and beginning after the first injection, ten drops of a 10 to 20 per cent emulsion of salicylate of mercury is injected into the gluteal muscle.

These mercury injections are continued until ten to fifteen injections have been given. Four weeks after the termination of this course of treatment a control Wassermann test is made. Two courses of such treatment should be administered during the first year and one or two courses during the second year, even though there are no pronounced clinical symptoms of syphilis in evidence.

Syphilitics who present themselves for treatment a year or two after primary infection are best treated by weekly mercury injections with an occasional injection of neosalvarsan in between.

Intensive Treatment of Syphilis of the Nervous System by Neosalvarsan and Mercury.—At a meeting of the N. Y. Neurological Society held Jan. 6, 1914, Drs. Frederick Peterson and J. W. Stephenson reported:

Every third day for five injections, 0,45 gm. of neosalvarsan was administered intravenously. In cases of paresis, taboparesis and other actively severe infections, this was supplemented by inunctions of mercury (from 40 to 60 grains) on the days the patient did not receive the neosalvarsan. The majority of unfortunate sequelae of neosalvarsan are attributable to faulty preparation or administration of the drug. Seventy-five c.c. make too concentrated a solution of 0,45 gm., and from 90 to 100 c.c. were invariably used. Freshly distilled water was boiled at least five minutes and then cooled to room temperature by running water. The apparatus used was the ordinary gravity one and the method of administration was as follows: Thirty c.c. of lukewarm, previously sterilized, normal saline solution were introduced, and as this escaped from the container, the neosalvarsan was poured in, and as the last portion left the container, 30 c.c. of lukewarm normal saline was again introduced. Special care was taken that as small an amount as possible of the neosalvarsan solution came in contact with the warm saline, lest the warmth of the latter increase the toxicity of the drug.

In the fifteen cases covered by this report, three were cases of general paresis, four were cases of taboparesis, six were cases of tabes, one was a case of cerebrospinal lues, and one was a case of meningitis, with gumma. One of the cases developed a severe arsenical dermatitis and resulted fatally. The other cases were uneventful. The immediate effect, or so-called reactions following the first series of injections, were as follows: It was the usual course with tabetics that the pains were much worse from twenty-four to thirty-six hours after the first injection. After the second injection there was sometimes slight exaggeration; after the third, usually none. In a very small number of cases a chill and slight temperature elevation followed only the first injection. There was no case of diarrhea. In a large majority of cases a slight conjunctival icterus appeared after the third injection, but this was of brief duration. In those cases supplemented by mercury the patient usually expressed himself as feeling very weak after the fourth injection, which was apparently attributable to the mercury. In paresis the mental condition was usually more pronounced following the first injection, but was not so affected by subsequent ones.

The illness in the fifteen cases was such that thirteen patients could not

pursue their usual vocation prior to the treatment. Among the thirteen, the improvement following the first series of injections was such that eight returned to their work within from six weeks to two months. Four showed slight improvement; two were considerably improved; one died.

The serologic examinations were made from three to twenty-seven days following the last injection. Of the fifteen cases, the Wassermann was positive in the serum only in two cases. One of these remained positive; the other was rendered negative. The Wassermann was positive in the spinal fluid only in two cases. Both of these were rendered negative. The Wassermann was positive in the serum and spinal fluid in eleven cases. One of these was not subsequently examined. Of the remaining ten, six were rendered negative, one weakly positive and three remained unaffected. Of these four, after the second series of injections, the weakly positive became negative and of the three unaffected cases one became negative and one remained positive, while in the remaining case no second test could be made. Pleocytosis was present in thirteen cases and there was a considerable reduction in all cases, with one exception. In twelve the protein test showed an excess of globulin, which was slight in one. Of these twelve cases, nine were rendered negative, and in three there was a slight excess. The one showing a slight excess was rendered negative.

Boyce [1] warns against the *overtreatment of syphilis.*

The cases should be treated individually, according to their needs, paying attention to cell-building, elimination by the skin, kidneys, liver and bowels, the general upbuilding of the system and the therapeutic doses of special remedies. Such a procedure will cure a patient more speedily, more certainly and with fewer regrettable accidents than that procedure followed from text-books, which blindly pushes mercury and iodism to their ulterior effects.

Contra-indications for Salvarsan.—The contra-indications for salvarsan are serious heart and kidney derangement—advanced disease of central nervous system—optic neuritis.

The Herxheimer Reaction in Salvarsan Therapy.—The so-called Herxheimer reaction, following immediately, sometimes while the patient is still on the table, or subsequently, the symptoms consisting of flushing of the face, watery eyes, intense headache, swelling of the mucous membranes of the mouth, abdominal cramps, etc., has recently been explained by Milian, a French writer, as being due to a dilatation of the blood vessels caused by the arsenic. In a number of cases in which he had previously observed this complex of symptoms he was able to prevent them after subsequent injections by the previous intramuscular administration of epinephrin.

Soamin (*Sodium para-amino phenylarsonate*).—Soamin has been suggested as a substitute for salvarsan. It comes in tablets (3 grains each, 0,194) and is given hypodermically once a week under control of the Wassermann test.

Mixed Treatment—Mercury and Iodid Given Together.—Mercury can be administered in any suitable way and iodid can be given at the same

[1] Boyce, *Southern Clinic.*

time by mouth or rectum in solution, or the following well-known combination may be prescribed:

℞	Hydrarg. bichlor.	gr. i	0,06
	Potass. iodidi.	ʒii	8,0
	Syrup. zingiberis.	ʒiv	15,0
	Aquae ad	℥iv	120,0

Dose—One teaspoonful twice or 3 times a day.

℞	Hydrag. biniodid.	gr. i	0,06
	Sodii iodid.	ʒii	8,0
	Syrup. zingiberis.	ʒiv	15,0
	Aquae ad	℥iv	120,0

Dose—One teaspoonful 3 times a day.

This form of treatment may be given to a traveling patient.

Intraspinous Injections of Salvarsanized Serum in Cases of Cerebrospinal Lues (Luetic Meningitis; Tabes; Paresis).—Salvarsan seems to have a greater predilection for most of the other tissues of the body than it has for nerve tissues, which may explain some of the non-success. It has been shown that the blood serum of recently treated or cured syphilitics has a marked trophic action on the specific spirochete and the following technic has been devised by Swift and Ellis, of the Rockefeller Institute, New York, for bringing an effective medical agent into immediate contact with the diseased process without incurring the danger of direct injection of salvarsan into the subarachnoid space. A dose, generally the maximum of salvarsan or neosalvarsan, is given intravenously in the usual manner. At the end of an hour from 50 to 60 c.c. of the patient's blood are drawn by means of venous puncture, clear serum is separated, diluted to 40 per cent with normal salt solution heated to 132.8° F. for half an hour, kept cool until the following day, then warmed to body temperature and injected into the subarachnoid space by means of lumbar puncture after the withdrawal of about 15 c.c. of spinal fluid, the amount of diluted serum injected being 30 c.c. After the first few injections if well tolerated 40 c.c. of a 50 per cent serum is usually injected. It must be injected slowly without much pressure. After the injection the patient is kept in bed for about twenty-four hours with head covered. The number of treatments varies with the case, but the general rule is to give eight or ten treatments, one every second week, and then discontinue them for a time, repeating, if necessary, and using as indices the Wassermann test with the blood and spinal fluid and the cell and protein estimations of the latter.

Favorable and unfavorable results from this method of treatment have been reported. According to the writer's experience, intraspinous injections have no advantage over intravenous injections.

Treatment of syphilis by injecting the virus or blood serum of luetics or by vaccination of attenuated virus has so far failed.

Pilocarpin in Syphilis.—Robinson has obtained good results from the use of pilocarpin in cases of syphilis which refused to be influenced further by mercury and iodids. The pilocarpin brings the mercury to the surface of the body, the skin lesions are directly affected and the syphilids disappear. Robinson says that if pilocarpin be given for a week or two and then discontinued, much smaller doses of mercury will be necessary in order to obtain the desired effect. He administers the pilocarpin alone, in 1/32-grain doses, giving three such doses daily.

Seaweed as an Antisyphilitic.—In a paper recently communicated to the Eastern Siberian Medical Association, Dr. Kirilloff dealt with the virtues of sea kale as a diet in syphilis. It is widely used as a food in Japan, and, as it contains combined iodin, the disease, which assumes such alarming characteristics in other countries, runs a comparatively mild course in Japan.

Mercurialized Serum for the Treatment of Cerebral and Systemic Syphilis.[1]—In cerebral syphilis the spirochetes are located in the cerebrospinal system and are unaffected by the intravenous or other use of the usual antisyphilitics. Dr. C. M. Byrnes, of Johns Hopkins University, has discovered that bichlorid of mercury loses its corrosive properties and may be administered intraspinally if dissolved in the proper amount of normal serum. Dr. Lloyd Thompson has used the same preparation by the intravenous route for the treatment of systemic syphilis.

For Intraspinal Use.—Mercurialized serum (Mulford) is furnished:

In 30 c.c. ampules containing 1,3 mg. (1-50 gr.) Mercuric Chlorid in normal serum and physiologic salt solution, with special sterilized rubber tubing and sterilized intraspinal needle.

In 30 c.c. ampules containing 2,6 mg. (1-25 gr.) Mercuric Chlorid in normal serum and physiologic salt solution, with special sterilized rubber tubing and sterilized intraspinal needle.

For Intravenous Use.—Mercurialized serum is furnished:

In sterile glass syringe, graduated in fourths, with sterile needle, containing 22 mg. (1-3 gr.) Mercuric Chlorid in 8 c.c. normal serum. Each one-fourth graduation of the syringe contains 5,5 mg. (1-12 gr.) Mercuric Chlorid and represents the usual dose.

Résumé of the Management of a Case of Syphilis

This will vary with the stage of infection. The patient should lead a simple regular life and should have the benefit of a liberal diet. In case

[1] For further information regarding Mercurialized Serum in the treatment of cerebral and systemic syphilis, *see* the *Jour. Amer. Med. Assn.*, Dec. 19, 1914, p. 2182, and May 1, 1915, p. 1471.

of fever rest in bed is necessary and a soft diet of 3,000 calories advisable. To aid digestion 10 drops of dilute HCl should be taken in water before each meal and a chlorate of potassium mouthwash and toothpaste should be used after each meal.

The patient should at once be provided with the following instructions:

Instructions for Persons Having Syphilis or Pox.[1]—1. Syphilis is a curable disease.

2. Three years' treatment is necessary to cure.

3. Patients' secretions, as saliva, etc., will infect others when in active stage of disease.

Rules for First Year:

1. Sleep alone.

2. Do not have sexual intercourse.

3. Do not kiss anyone.

4. Brush teeth night and morning, and wash mouth frequently with wash prescribed.

5. Have teeth put in good order by dentist, doing same every two months. Tell dentist that disease exists so he may protect himself and others.

6. Smoking, chewing, or the use of tobacco in any form, *absolutely* prohibited; it will cause sores in the mouth, infect others, and delay cure.

7. No alcohol except light wine at meals if prescribed by physician; at least six glasses of water daily.

8. Meals regular; no heavy night lunches; avoid acid foods and drinks; food nourishing and simple; meats, vegetables, soups, etc., but no pastry or fancy dishes.

9. Sleep at least nine hours.

10. Mild out-of-door exercise, as walking, tennis, golf, etc., as much as possible.

11. Guard against bruises, sprains, and injuries.

12. Never overexert mentally or physically.

13. Clothing appropriate to climate and season should be worn; avoid wet feet; do not catch cold.

14. Bathe daily, hot or cold water as agreeable, followed by brisk rub with coarse towel. At least two Turkish baths each week; if possible, tub bath at bedtime. No cold shower or plunge after Turkish or hot bath, as they are taken for the purpose of sweating.

15. Do not allow anyone to use articles that have been in your mouth, as pencils, toothpicks, pipes, spoons, forks, knives, cups, cigars, etc. In public restaurants do not use chipped cups; destroy toothpick used.

[1] Issued by Committee on Prophylaxis of Venereal Diseases, Washington State Medical Association, for distribution by physicians.

16. Under no condition allow razors, towels, combs, shaving brushes, etc., to be used by others.

17. Symptoms of indigestion, constipation, or headache report to physician.

18. When saliva increases, gums become sore and bleed when touched, tenderness noted when teeth come together, breath smells bad and there is a metallic taste in the mouth, cramps in bowels, or diarrhea, notify physician.

19. Marriage must not occur for four years after infection.

Whether chancre excision is practiced or not, specific medication must begin at once. If salvarsan or neosalvarsan has been decided upon, one full dose should be given by the intravenous or intramuscular route and thereupon mercury should be administered.

Treatment in the first six months must be vigorous and continuous without intermissions unless toxic symptoms demand a different course. Twenty to thirty injections of salicylate of mercury in intervals of five to ten days may be given during this period. After a treatment interval of three to four months, fifteen more half-dose injections of salicylate of mercury may be given or mercury in some other form. The dose of the drug to be used will depend upon age and condition.

Rules for the Second Year:

During the second year two courses of mercury and iodids are to be given the mercury in half the dose of the one year and the iodids in full doses.

Rules for the Third Year:

During the third year the iodids in proper intervals are most valuable and mixed treatment is occasionally demanded.

Rules for the Fourth Year:

A patient who has gone through the treatment and shows a negative Wassermann and who presents no symptoms during the fourth year and no positive Wassermann at the end of the fourth year is practically cured of his syphilis.

Enthusiastic advocates of salvarsan administer six to twelve injections the first year and some more thereafter. Time and experience will show whether or not such a course is a safe one.

Local and Auxiliary Management.—A *non-ulcerated chancre* may be covered with mercurial plaster or dusted with nosophen or with starch powder containing twenty-five per cent of calomel.

Local inflammation may be subdued by means of a wet dressing of boric acid solution (4 per cent). For ulcerated chancre we employ black wash.

Gangrenous chancres require the actual cautery and a subsequent wet dressing of boric acid.

In chancre with phimosis an attempt may be made to cleanse the parts by injecting antiseptic solution under the prepuce; when this is not feasible a dorsal slit or circumcision will expose the parts to be treated.

Secretions from *intra-urethral chancres* are washed out by the stream of urine and rarely require local treatment.

Chancres of the rectum, vagina and cervix uteri require cleanliness, warm irrigations with antiseptic fluids (mercuric bichlorid 1 to 5,000), medicated tampons and suppositories.

Chancres of the lip may be covered with mercurial plaster.

Chancres of the tongue and mouth and mucous patches, etc., require antiseptic mouth washes and gargles and occasional cauterization with five per cent silver nitrate solution.

Macular and papular syphilids may be treated locally with white precipitate salve.

Pustular syphilids need cleansing with a mercurial wash (black wash) or bichlorid solution (1 to 5,000).

Ulcerative syphilids may need touching up with five per cent silver nitrate solution.

Condylomata lata disappear with constitutional treatment and calomel as a dusting powder. Ablation may be necessary.

Loss of hair in lues is rarely permanent. A weekly shampoo and the occasional use of pomatum containing ten per cent white precipitate ointment is the proper procedure in such cases.

Onychia or nail bed inflammation is subdued by cleansing with hydrogen peroxid and dressing with white precipitate ointment.

Palmar and plantar syphilids respond to warm baths and mercurial dressing at night.

Active syphilis in pregnancy and antenatal lues are treated with mercury precisely as under ordinary circumstances. When secrecy is enjoined, the mixed treatment can be administered to the pregnant woman under the guise of a tonic.

Anemia from syphilis or in consequence of the specific medication necessary, is frequently observed and calls for good judgment and caution in the conduct of a given case.

Baths in Syphilis.—The eliminating and stimulating action of warm baths and cool douches can be had in most well-regulated households. The therapeutic virtues of mineral waters in syphilis are not noteworthy. With this understanding the sojourn of a syphilitic individual with a plethoric pulse at a spa is in no way contra-indicated.

Climate in Syphilis.—A change from the seashore to the mountains and vice versa is stimulating in every instance and can be recommended.

Treatment of Syphilis in Childhood

The management of acquired syphilis in childhood is the same as in the adult but the dosage must be regulated according to age—one-fifteenth or one-twelfth of that required by the adult. Salvarsan treatment is not advisable in infants and young children according to the writer's experience.

Treatment of Hereditary Lues.—For the early manifestations of hereditary lues mercury is the most dependable drug.

INGESTION

Calomel	gr. 1/30 to 1/20	3 times a day
Hg. cum creta.....	gr. ½ to 1	3 times a day

INUNCTION

Ungt. hydrargyri and lanolin—equal parts.

Minimum dose:

1 year	0,5	7½ gr.
2 to 3 years	1,0	15 gr.
4 to 6 "	1,5	22½ gr.
7 to 10 "	2,0	30 gr.

Salvarsan can be administered to children intravenously in one-tenth to one-quarter of the adult dose. It is best to expose the vein before inserting the needle. Infants and young children do not respond favorably to salvarsan. The writer has given salvarsan to a nursing mother without observing any curative action in the luetic infant.

The iodids (K and Na) are useful in the tertiary stage of lues in children, particularly in the form known as tardy hereditary lues (gr. ii to v 3 times a day).

Duration and Mode of Treatment.—The interrupted method consists of a course of treatment extending over, say, three months, then waiting several months and repeating the treatment, and so on for three years.

Treatment of Symptoms in Syphilis in Childhood.—1. The snuffles. For the snuffles, calomel, 1 part, and sugar, 20 parts, may be prepared as a snuff or as an insufflation. An ointment of the yellow oxid of mercury, 1 gr. to the dram, may be brushed into the nostrils; or the white precipitate ointment, 1 part, and lanolin or vaselin, 3 parts, may be brushed into the nose.

2. For generalized eruption, bichlorid baths, plaster mull (Hebra) or some non-irritating dusting powder may be used.

3. Visceral involvement or tumors. Any of the energetic forms of treatment, already referred to, as injections, inunctions, etc.

4. For condylomata the area is washed with a 1 or 2 per cent salt solution and then dusted with calomel.

5. Fissures or rhagades about the mouth may also be treated with calomel powder, or if they are at all persistent they may be carefully touched up with a 10 per cent chromic acid solution or with a 1 per cent sublimate solution.

6. For persistent or unyielding onychia, mercurial plaster wound about the finger gives favorable results.

7. For anemia the various iron tonics may be employed, also protofer.

8. For mercurial enteritis, which sometimes occurs, the mercury should be stopped and the treatment should be directed toward the enteric condition, as is usually practiced in such cases.

9. For tertiary symptoms, such as the severe headaches, the bone involvement and the visceral lesions, the iodids should be employed or, where the symptoms are urgent, a mixed treatment may be used; for such cases the iodids and mercury should be pushed.

The influence of the specific treatment becomes apparent in a few days. The eruption becomes paler and new skin lesions seem to be prevented. The rhagades and the patches on the mucous membrane seem to improve after four or five days' treatment. The pseudoparalysis, due to the osteochondritis, improves rapidly. Most resistant against treatment is the rhinitis. The discharge of secretion will continue for a long time, and even after this has ceased a peculiar noisy or snuffling respiration continues.

The Diet.—If it is possible, these infants should be nursed by the mother. This is a great advantage to the infants. They are less liable, as a rule, to become rachitic, and it is a known fact that syphilitic children are especially susceptible to rickets. It is not right, however, that a wetnurse should be chosen for these children. The danger of infecting the wetnurse is extremely great and in every instance unjustifiable. This danger, it is well known, does not exist so far as the mother is concerned, for she is already infected.

So far as the artificial feeding is concerned, syphilis, as well as all other general intoxications, tends to retard the development of infants and interferes with the nutrition. Congenital syphilis, then, predisposes the infant to atrophy or marasmus.

Syphilitic children are predisposed to alimentary disturbances, and they are also more susceptible to intercurrent acute infections, particularly septic conditions. There is no doubt that the study of a large number of these cases shows that the mortality is by far greater among the infants that are artificially fed than among those syphilitic children that are breast fed.

C. Carcinosis—Sarcomatosis

Definition—Causation—Relationship

By cancer is meant a malignant *epithelial* new growth (ulcer and tumor). Sarcoma in its various pathological varieties is a malignant new growth built up on the type of *connective tissue* in which there is a predominance of intercellular stroma over cellular tissue.

Malignant tumors have a tendency to grow and spread until life is destroyed—they have a tendency to recur after operative treatment, and in some instances they have a tendency to spread more rapidly *after* operative interference.

The cause of cancer is unknown.

There has been a tremendous amount of research with regard to malignant new growth, but up to the present time the real nature or cause of carcinosis remains an enigma. We have elicited no good evidence that cancer is hereditary, or that it is communicable in man or that it produces immunity, as do other infectious diseases. Transplantation of cancer from one animal to another—notably in mice—has been accomplished but such transplantations are not really inoculations, as in the case of tuberculosis or syphilis, nor do subsequent generations of mice so treated show immunity. We believe that cancer at first is a purely localized malady and that its dissemination takes place through the lymphatic channels, and we believe that a purely localized cancer can be cured by the early application of the knife or Paquelin cautery.

Including cancer of the breast and uterus, cancer is more common among women than men. Excluding these, cancer is more common in men. Cancer of the mouth and stomach is more common among men probably on account of their drinking and smoking habits. Cancer of the bile ducts is more common in women just as gall-stones are more common among women.

The assumption that cancer, which is identical in all vertebrates, is due to a parasite or to *incoördination of internal secretions* is not proven nor do the proliferating epithelial cells of cancer show the characteristics of embryonal cells, but rather those of senile degeneration. The etiology of malignant neoplasm has not been solved and that is all that can be said on this subject at present.

The structural characteristics of malignancy as seen through the microscope have been studied exhaustively; at the same time we must admit that diagnostic errors, particularly in regard to differentiation between luetic and malignant manifestations, are frequently recorded. Thus the careful clinician in every case of suspected malignancy in which the Wassermann

reaction is not frankly positive, will be tempted to give the patient the benefit of the doubt and institute antisyphilitic treatment before resorting to radical operative measures. Little time need be lost by such a procedure and many an operation has been avoided.

Irritation a Contributing Factor.—As to contributing factors in the causation of cancer it may be stated that prolonged irritation is a predisposing factor, or perhaps only an exciting factor, as, for instance, traumatism in tuberculosis.

Chronic irritation of any kind including the irritation by sunlight or x-rays on benign lesions, may induce malignancy. The irritations from gall-stones are a factor in the production of cancer. Czerny, of Heidelberg, believes that an x-ray dermatitis acts simply as a portal of entry for a cancer-generating organism. Irritation incident to chronic constipation and frequent swallowing of hot food are in all probability provocative factors.

Precancerous Conditions.—In places in which we usually encounter cancer we meet with lesions and new growths which histologically are not cancer. These lesions have been called *precancerous* and their radical removal is not followed by recurrence. It is imperative to emphasize the importance of precancerous conditions in the surface of the body. In cancer of the abdominal viscera it is more difficult to detect a precancerous condition and remove it in good time.

Diseases that Precede Cancer.—Scars following burns or other extensive injuries are often the seat of malignant degeneration. Paget's disease of the nipple is another condition that precedes carcinoma. Lupus, leg ulcers, birthmarks, fissures of lips and arms and psoriasis of the tongue are occasionally the starting point of cancer as are warts and moles, particularly the pigmented variety.

Lumps in the female breast and the condition known as chronic cystic mastitis are not frequently the starting of cancer. Uterine fibroids, hypertrophy of prostate and gastric and duodenal ulcers are frequently the starting point of cancer, also hemorrhoids and fistulae.

Heredity of Cancer or the Family Tendency.—Not many years ago the belief was universal that tuberculosis was hereditary in origin. Today we accept the teaching that only a tuberculopathic constitution may be inherited. As a result of cancer study and observation we believe today that in certain individuals an inherited susceptibility to cancer exists, that while cancer itself may not be due to family heredity, it arises as the result of the gradual development of an inferior stock. To put it differently, the susceptibility of cancer may follow family lines. In order to demonstrate the hereditary characteristics of this disease, family histories covering several generations must be investigated with modern scientific accuracy.

Cancer and Old Age.—Cancer in some way is allied to senile changes

in the tissues. The fundamental phenomenon of old age is retrogression of cells and tissues. In the case of epithelial cells their growth does not cease with old age; on the contrary there is a tendency for epithelial structures to undergo proliferation. This senile proliferative activity cannot be the fundamental cause of cancer, else cancer would be the natural termination of life in all cases.

According to the statistics of Haeberlin, about 72 per cent of all cases occur in the period between the fortieth and seventieth years. According to a statistic series of Hahn's, including 166 cases, more than one-half concerned individuals who had passed the sixtieth year. Eisenhart likewise states that the maximum occurrence is beyond the sixtieth year of life. Reiche calculates for gastric carcinomata in particular, that approximately 60 per cent of the cases occur in patients between fifty to seventy years of age. His statistics distinctly show, however, that the cancer mortality in general, as well as for gastric cancer in particular, is becoming displaced into earlier decades in such a way that among men, the group between forty to fifty years of age, are much more frequently attacked at present than they were about twenty years ago.

Sarcoma on the other hand is found at any age but is most often encountered between twenty to fifty.

The Suspicion of Malignancy.—Dr. H. Lilienthal, of New York, reports that in his experience, after the first discovery of a tumor, or after the first suspicious symptoms, the men had waited on the average 12.2 months before consulting the surgeon, the women 11.9 months. Now it is known that very few persons discover or suspect the presence of cancer until the symptoms are very pronounced, or until there is a tumor of considerable size; also, that such a tumor, with or without symptoms, had probably been in existence for say six months before it was discovered. So that it may be assumed that cancer patients do not come to the operating table until at least a year and a half after the onset of the malignant disease.

Continuous Loss of Weight and Increasing Anemia.—The regular use of the scales in suspicious cases cannot be too strongly urged. If the disease takes a slow course, patients may have their ups and downs, but a *steady* loss of flesh, in conjunction with gradually increasing anemia and general weakness, not necessarily cachexia, points to the presence of carcinoma.

Cardiac Dullness and Cancer.—A progressive diminution of cardiac dullness in the recumbent posture has been noticed in cases of cancer.

Classification and Nomenclature of Cancers.[1]—A committee composed of the authors reported at the recent international cancer conference on a uniform nomenclature for cancer. They advocate that all malignant tumors should be divided into three classes: (1) epithelial cancers; (2) con-

[1] Drs. Delbet, Menetrier and Herrenschmidt, *Jour. Amer. Med. Assn.*, Feb. 11, 1911.

nective tissue-vascular cancers (the generic term sarcoma applies to this class), and (3) cancers formed of multiple tissues. The first group, epithelial cancers, is subdivided into (*a*) epitheliomas of the skin and mucous membranes with stratified pavement epithelium; (*b*) those of the glands connected with stratified pavement surfaces and linings, including the sweat, sebaceous, mammary and salivary glands and alveoli, the thymus, thyroid and hypophysis; (*c*) those of cylindrical epithelium as in the nasal fossae, the sinuses of the face, the larynx, trachea, bronchi and lungs, stomach and intestines, uterus and tubes and fetal chorion; (*d*) epitheliomas of the glands connected with the digestive tract, the liver, the bile ducts and pancreas; (*e*) epitheliomas of the visceral glands and epithelial parenchymas, as in the suprarenals, kidneys, pelvis, ureters, bladder, urethra, prostate, testicles and ovaries; (*f*) epitheliomas of nerve tissue neuroglia and neuroganglia, and of the organs of sense, the ear and eye. The second great class, the connective tissue-vascular variety or sarcoma, includes (*a*) sarcomas of ordinary connective tissue; they may be either spindle-celled, round or polymorphous celled, myxomatous or lipomatous; (*b*) sarcoma of tissues originating in connective tissue, specialized in bone or cartilage; (*c*) sarcoma of blood or lymph vessel tissue or of the spleen pulpa. This category includes also affections intermediate between simple hyperplasia and cancer, the chloromas and multiple myelomas; (*d*) sarcoma of endothelial and perithelial tissues, including cancer of the endothelial lining of the great serous membranes, and endothelial sarcoma of the joints, of the blood-producing system, meninges and vessels; (*e*) melanic sarcoma, and (*f*) sarcoma of muscle tissue. The third great group, cancers with multiple tissues, includes (*a*) those with a double combined malignant evolution, and (*b*) cancerous evolution of teratomas and embryomas. The term "carcinoma" should be dropped, the committee declares. It is merely the Greek word for "cancer," and cancer, carcinoma and krebs are merely different terms for "the crab." According to the nomenclature proposed, malignant growth should always be designated as either an epithelioma or a sarcoma, accompanied by the name of the tissue from which it is derived, and when precision is desired, by the structure of the growth and whether it is typical, atypical or metatypical, as for example, "an osteoid osteoblastic sarcoma of the jaw," or "a metatypical and infiltrating cylindrical epithelioma of the fundus of the uterus."

Cancer Tests.—A Urinary Test for Cancer or Sarcoma.—Dr. C. H. Walker and F. Klein published in the *Postgraduate,* for August, 1914, the following urinary test for malignancy, based on chemical observations:

Two solutions are made for comparison of color.

First: To 10 c.c. of distilled water is added 10 mn. of a 1/10 normal iodin solution (U. S. Pharmacopeia, p. 549). This is marked "A" and is about the color of normal or non-malignant urine after the reaction is used.

Second: To 10 c.c. of distilled water is added 3 mn. of a 1/10 normal iodin solution (U. S. P.). This is marked "B" and will correspond very closely to the urine of a malignant case after the urine is tested.

Now test the urine as follows:

To 4 c.c. of urine is added 10 mn. of a 1/10 normal iodin solution (U. S. P.) and well shaken. To this is now added 4 c.c. of hydrochloric acid, C. P. Sp. Gr. 1.19 and well shaken.

As the urine now compares in color with "A" you may consider the case non-malignant or to "B" a malignant case.

Abderhalden's Test in Cancer.—The great need for a ready means of diagnosis of cancer, especially in its earliest stages, has led to the trial of various so-called serum tests.

The latest proposal in this direction is Abderhalden's test, concerning the use of which in other conditions much is being written nowadays. This test is based on the consideration that when foreign proteins get into the blood, the body reacts by elaborating a ferment which causes their disintegration.

Abderhalden has shown that the serum of cancerous patients contains a specific substance not found in the blood of those not affected, that it has proteolytic action limited to cancerous tissue, and that the better the patient's general state of health the more rapid and intense is the reaction. This latter assertion is of special interest because it offers the possibility of very early diagnosis in cases of suspected malignancy—diagnosis at a time when surgery offers the greatest hope of complete eradication of the cancerous focus.

The method is simply this: A small piece of cancerous tissue is placed in a dialyzing-sack and covered with a few cubic centimeters of the serum of the suspected cancer patient; this sack is put in a two per cent solution of sodium fluorid in a suitable container and the whole placed at 22° C. (71.6° F.) for thirty-six hours. At the end of this time the fluid outside of the dialyzer is tested for products of protein digestion. The presence of peptones signifies a positive result—the patient has cancer. It is absolutely necessary for perfect sterility to be maintained throughout, as contamination spoils the result.

Prognosis.—The percentage of cures in fully-developed cancer is small. There is a difference between pathological or clinical malignancy in tumors or new growth which is not as yet understood. In cases of breast cancer in which the diagnosis could be made clinically on account of retracted nipple or adherent skin the proportion of cures after five years is about twenty-five per cent. The majority of cases of skin cancer are curable.

Spontaneous healing of epithelioma and sarcoma is a well-authenticated rare occurrence.

Cancer in Relation to Life Insurance.[1]—R. Kingston Fox says that during the past thirty years the mortality from this disease in England and Wales has risen in the case of males 150 per cent and in the case of females 60 per cent. Cancer now accounts for one in every nine deaths among all adults of twenty-five years and upwards. In women between the ages of forty and sixty years it accounts for one in every five deaths. As regards the insurance of women, the liability to malignant disease of the uterus and breast during the middle period of life has become so great that it is a question whether female lives in whose family histories there is a single such record among parents or brothers and sisters should ever

[1] *Life Assurance Medical Officers' Association*, Jan. 7, 1914.

be taken without a rating. The increase of cancer dictates also special care in dealing with evidence of slight derangement of various organs and especially of the digestive system, for it is in this tract that the increase of mortality has been most marked.

Mortality in Cancer.—It is estimated that one out of every eight women and one of every eleven men, after the age of thirty-five, die from cancer. Gaylord in his last report stated that the mortality from cancer in the United States for the year 1910 exceeded 75,000, and the morbidity was over 200,000. For the same year in New York State the mortality was 7,500, an increase of 470 over the previous year, with a morbidity of over 20,000. Crile has estimated that there are over 80,000 people in the United States, who are apparently well at this moment, that will be afflicted with incurable carcinoma within six months.

The apparent increase of cancer is essentially referable to its improved establishment and recognition during life and after death. Meanwhile, an actual increase of mammary cancer in particular, in connection with a decrease of fertility, cannot be altogether denied.

The New York State Department of Health, January, 1914, reports as follows:

Cancer caused in the twelve months 8,525 deaths; in 1912, 8,234; in 1911, 7,956; in 1910, 7,500; in 1909, 7,034 deaths. For the five years there have been 81 deaths per 100,000 population. They composed 5.3 per cent of the mortality; for this year 5.8 per cent. In 1892, 2.6 per cent of the deaths were attributed to cancer. The deaths from cancer have quadrupled in twenty-five years with a steady increase every year, while the deaths from all causes have not doubled. In the urban population 5.8 per cent of the deaths were from cancer; in the rural 6.1 per cent, in this current year.

General Principles of Prophylaxis Against Cancer

The first step toward solving the cancer problem or the natural history of malignant tumors is the scientific and clinical study of cancer in research hospitals, under the title of *skin and tumor hospitals.* Every type of patient in any stage of the disease should be admitted and the public must be educated to the necessity of a post mortem study of fatal cases. Equally important is the education of physicians and laymen in regard to the etiological significance of chronic irritation and the necessity of removing —surgically or otherwise—all external precancerous conditions and of performing an early exploratory operation in suspected internal cancer. The greater the predisposition, the less irritation is required to elicit cancer growths. Those who escape to the age of sixty show that the predisposition

is slight or absent. Furthermore, it is important to educate the public up to the wisdom of eliminating overwork or drudgery after the age of fifty, and of adjusting work and responsibilities to the declining strength of the body.

Attention must be given to hemorrhoids, fistula and constipation as sources of irritation to the intestine and to irritation of the mouth from sharp teeth and plates and of the esophagus and stomach from peppery and burning hot food (liquid or solid) and strong drink. Traumatism of any nature is undoubtedly a contributing factor in the causation of ulcer, and thus many forms of injury likely to become subject later to cancerous degeneration can be avoided.

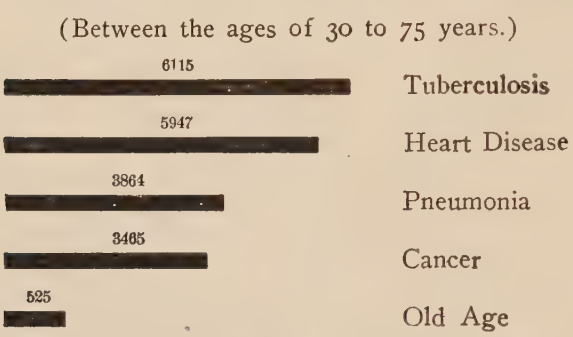


FIG. 92.—RELATIVE IMPORTANCE OF CANCER AS A CAUSE OF DEATH IN NEW YORK CITY DURING 1911. (Courtesy of Dr. Parker Syms, New York.)

There is no proof as yet that cancer is transmitted from person to person, nor have we good evidence of the inoculation of carcinoma. Physicians and surgeons become inoculated with syphilis and tuberculosis and other acute infections, but infection through injury at a cancer operation is not known, nor is a person nursing a cancer patient liable to contract the disease. Nevertheless it is not advisable for anyone to wear the clothing a cancer patient has used without first thoroughly sterilizing it.

Cancer Education

The Borough of Portsmouth, England, publishes monthly in the local press the following official notice:

1. Cancer, in its early and curable stage, gives rise to no pain or symptoms of ill health whatever.
2. Nevertheless, in its commonest situations, the signs of it in its early stage are conspicuously manifest. To witness:
3. In case of any swelling occurring in the breast of a woman after 40 years of age, a medical man should at once be consulted. A large proportion of such swellings are cancer.
4. Any bleeding, however trivial, occurring after the change of life means almost invariably cancer, and cancer which is then curable. If neglected till pain occurs, it means cancer which is almost always incurable.
5. Any irregular bleeding occurring at the change of life should invariably be submitted to a doctor's investigation. It is not the natural method of the onset of the change of life, and in a large number of cases means commencing cancer.

6. Any wart or sore occurring on the lower lip in a man after 45 years of age is almost certainly cancer. If removed at once the cure is certain, if neglected the result is inevitably fatal.

7. Any sore or swelling occurring on the tongue or inside of the mouth in a man after 45 years of age should be submitted to investigation without a moment's delay, and the decision at once arrived at by an expert microscopical examination whether it is cancer or not. A very large proportion of such sores or swellings occurring at this time of life are cancer, and if neglected for even a few weeks the result is almost inevitably fatal. If removed at once the prospect of cure is good.

8. Any bleeding occurring from the bowel after 45 years of age, commonly supposed by the public to be "piles," should be submitted to investigation at once. A large proportion of such cases are cancer, which at this stage is perfectly curable.

9. When warts, moles, or other growths on the skin are exposed to constant irritation they should be immediately removed. A large number of them, if neglected, terminate in cancer.

10. Avoid irritation of the tongue and cheeks by broken, jagged teeth, and of the lower lip by clay pipes. Many of these irritations, if neglected, terminate in cancer.

11. It is desirable that rooms occupied by a person suffering from cancer should be cleaned and disinfected from time to time.

Treatment of Malignant Disease in General

At the present time the surgical treatment by knife and cautery stands foremost in the management of malignant disease because carcinoma is, for a certain length of time at least, a purely local disease. Hence it follows that carcinoma should be removed as soon as possible. In cases of doubt as to whether a tumor is benign or malignant it is preferable to proceed as though the growth were malignant. Metastases exclude a cure as a rule.

Curable cancer can be divided into operable and inoperable. Inoperable cancer is not necessarily incurable. A description of the details of operative treatment of cancer by the knife is not within the scope of this work.

Operations and Metastasis in Carcinoma.—For many years there has been a feeling among surgeons that mechanical disturbances of malignant tumors are dangerous, on account of the increased liability to metastases, or secondary growths, incident thereto. This view has been based, in the past, on purely clinical observations; recent labors along experimental lines with mouse cancer have tended to strengthen it.

From the surgeon's standpoint this is an exceedingly important matter. What he wishes to know is, whether the growth of secondary masses, in patients in whom metastasis has already occurred, will be accelerated by the removal of the primary tumor, whether life will be shortened or prolonged, and whether the procedures following the course of physical exam-

inations or surgical operations increase or diminish the frequency of, or liability to, metastases.

Thermic Treatment of Cancer.—This is accomplished by means of the actual cautery, thermocautery and the fulguration process. Cancer cures following the application of the cautery to so-called inoperable cases have been occasionally observed and reported in German, French, American, literature, as also literature of other countries.

Doctor Byrne [1] reports his experience in the treatment of cancer with the galvanocautery as follows: 90 cases with no recurrence within from 2 to 17 years and a number were from 5 years or more. He claims that when the cautery knife is applied cold and then heated no hemorrhage will result. No fever or pains will follow the operation by cautery; no recurrence in the line of the cicatrix.

Similar results were reported by Baker and Reamy of Cincinnati in the *American Journal of Obstetrics,* in 1891.

In using the actual cautery the ordinary soldering iron is more effectual than the Paquelin because it has more body. In applying the actual cautery, heat the iron to a dark cherry red color, then thoroughly cauterize not only the raw surface but some distance beyond. It may be necessary in some cases to use the actual cautery a number of times to bring about the desired result, but the depth of the cauterization can always be regulated, there being no danger of its extending too deeply.

All that is known on the subject will be found in a monograph on the curability of cancer by Dr. R. Somer [2] of Hamburg.

Ionic Treatment in Cancer.—This method of treating malignant new growths is practiced by Dr. G. B. Massey of Philadelphia and others.

The growth is destroyed by minute particles of zinc which are introduced into the tissues by means of a powerful electric current. Points of mercury-coated zinc needles are thrust into the tumor and diffused by the electrolytic and cataphoric power of strong currents. This takes but a few minutes in case of small tumors and about one hour for larger ones. The positive electrodes are placed in the growth—a pliant metallic plate at the back acts as the negative. On recovery from the anesthetic the patient suffers no pain. In the course of from one to three weeks the dead mass separates from the healthy tissue and the wound heals by granulation.

Judging from reported results this method is worthy of a trial in inoperable cases.

Electrocoagulation.—This method as practiced by Doyen, in France, is based on the theory that cancer cells are destroyed by a temperature between 122° to 133° C. According to Dr. Bainbridge,[3] the patient is wrapped in a large rubber mat and the negative electrode, which consists

[1] *Brooklyn Med. Jour.,* 1892.

[2] Somer, R., *Ztschr. f. Geburtsh., u. Gynaek.,* Bd 1, H. II.

[3] Bainbridge, *Internat. Clin.,* Phila.

of a sheet of pliant metal, is bound to the abdomen and is kept wet by a stream of water which is played upon it constantly. The positive electrode, which must correspond in size to the size of the lesion under treatment, is placed in direct contact with the growth and the current turned on. The electrode must be kept in contact, otherwise sparking would result. The current has a strength of from 10 to 15 amperes and changes polarity 3,000,000 times a second. With this current, using an electrode three centimeters in diameter it is possible to coagulate to a depth of from five to eight centimeters in from one to two minutes. As in ionic surgery the cancer cells are destroyed *in situ* by the passage of the currents. In electrocoagulation the slough detaches in from ten to fifteen days, leaving a granulating surface. The method has been employed in nearly one hundred cases at the Skin and Cancer Hospital, New York, but too short a time has elapsed to permit any definite conclusions to be drawn regarding the curative powers of this agent.

The Fulguration Treatment of Cancer.—The fulguration process of dealing with cancer was first taken up as an adjuvant to surgery by de Keating Hart of Marseilles. The current used is the Oudin monopolar or d'Arsonval (bipolar) high frequency current.

The cancer is first thoroughly excised, and immediately following this, and with the patient still under complete narcosis, the high frequency d'Arsonval current is applied to the exposed tissues, until disintegration or necrosis of the surface is accomplished. This process usually gives rise to a decided reaction, with considerable edema and superficial tissue necrosis, together with a free flow of serum, followed by good healing. During any extensive cancer operation, with the more or less prolonged handling of the tissues entailed thereby, there is always danger of the cancer cells finding their way into the lymphatics or open veins, thus increasing the likelihood of metastases, and it is the claim of Hart and others that by the destructive action of the high frequency current the danger of metastases is largely avoided. The results thus far seemed to be very encouraging, and the treatment had recently been adopted at the Cancer Clinic at Heidelberg by Prof. Czerny, whose reputation for caution and conservatism is well known.

The fulguration process is applicable *without primary excision* to small superficial growths. The high tension spark electrode is moved about over the surface involved at a distance of two to four centimeters, the patient being deeply anesthetized. After from five to forty minutes of this, the diseased tissue is enucleated with the scalpel or is curetted away and the raw surface is subjected to a further period of fulguration in order to cause the death of any cancer cells that have escaped destruction the first time. The fulguration process has been applied to intravesical malignant new growths after suprapubic cystotomy for the purpose of gaining access

to the parts to be treated. As regards permanence of cures following this form of treatment no definite opinion can be given for the present.

Röntgen Rays in Cancer.—The true value of x-rays in the treatment of cancer is still a matter of discussion. Improvements in apparatus and modifications of technic are making possible the exact measurements of dosage and therefore we may expect within the near future to know the possibilities and limitations of this form of treatment.

The favorable effect of x-rays in epithelioma is indisputable. There are biologic differences in the various kinds of epithelioma not yet explained and on which the success of the x-ray treatment is dependent. In applying x-rays a space three times the size of the tumor should be treated and all the rest should be protected. Medium-soft tubes are to be used and the intervals between the sittings must not be too long. In those cases in which no favorable influence is produced by the x-rays after the fourth or fifth sitting this treatment may be discontinued as futile. In cases of metastatic cancer the x-ray treatment has not been successful.

Of all malignant new growth *rodent ulcer* is the most superficial and good results have been reported in such cases.

X-rays can be utilized *in combination* with radium, mesothorium and selenium. When the knife is used this combined treatment may be employed afterwards as a prophylactic.

The duration of treatment with x-rays ranges from three to twenty-four months and over, and depends upon so many factors that it is difficult to form any accurate judgment from published reports and statistics.

Radium, Selenium and Mesothorium in Cancer.—Good results have been observed from the use of radium in superficial or skin cancer. So far there is practically no proof that radium has cured a single case of advanced or disseminated cancer.

The *Wiener klinische Wochenschrift*[1] contains a symposium on the results of radium treatment of cancer. The consensus of opinion is that the effects obtained are by no means uniformly favorable. The bad results noted—especially from over exposure to radium—have been vertigo, vomiting, agitation, poor pulse and collapse as immediate symptoms, and emaciation, cardiac weakness, headaches, sleeplessness, bladder and intestinal disturbances, among the permanent discomforts.

For mode of application *see* Section I.

The Selenium Treatment in Cancer.—While operative interference in cancer is still to be advised wherever possible, the selenium treatment deserves to be mentioned for inoperable and recurrent cases and before and after operations. Laboratory research has shown that in cancer there is a deficiency in the oxidation of sulphur. It is claimed that the deficiency may be corrected by the administration of selenium, which is a powerful oxidizer—especially of sulphur.

[1] *Wien. klin. Wchnschr.*, No. 41.

The treatment consists in the administration of soluble selenium preparations either hypodermically, direct into the tumor, intravenously or *per os;* or of insoluble preparations *per os* or in the form of ointment.

The best soluble combinations are: selenium-dioxid; potassium and selenocyanate; potassium and selenovanadite.

Of the insoluble preparations the vanadium selenides or sulfoselene may be tried. Under the use of sulfoselene pain is markedly decreased.

It is advisable to begin with 1/60 to 1/20 grain of selenium a day and to gradually increase the dose—in several cases up to one-half a grain a day.

If subjective symptoms in the abdomen similar to those in lead poisoning occur, the treatment should be discontinued for a fortnight, beginning again with smaller doses gradually increased.

For the ointment, the dose may be from ten to twenty times larger.

Thorium in Cancer.—Both mesothorium and thorium X are solids. Thorium X sends out only α and β particles and therefore has only a limited applicability. It may be used for injection into a tumor or for superficial tumors. Thorium X has only a relatively short period of activity; after three to four days it gradually diminishes in activity. Mesothorium, which gives off both β and γ-rays, but no α-rays, has a very much longer period of activity and increases in power up to about three and a quarter years; after twenty years half of the activity will have been lost. When speaking of mesothorium, both mesothorium 1 and 2 are considered. The measurement of the activity of the mesothorium preparations is made by a comparison of the γ-rays with the similar rays of a radium preparation.

Combined Treatment of Carcinoma.—X-rays, mesothorium, intravenous injection of radium, barium and selenium (formula Merck) have been employed in combination, in the treatment of cancer.

Treatment of Superficial Cancer with Caustics.—Arsenous acid, sulphuric acid, acetone, salicylic acid, nitric acid, caustic potassa, chromic acid, dichloracetic acid, etc., are employed in the treatment of superficial cancer.

Michell's Paste.—Place a quantity of powdered soapstone upon a glass slab and add to it chemically pure sulphuric acid drop by drop, rubbing continuously until proper consistency is obtained. It should always be freshly made and in employing the paste the skin should be covered with adhesive plaster having a hole larger than the place to be cauterized. The surface of the epithelioma should be denuded by curetting. The application of the caustic causes pain which requires general or local anesthesia; by injecting a four per cent solution of cocain some distance from and completely around the margin of the neoplasm sufficient anesthetization can be produced, and the paste is then applied. After waiting two or three minutes, wipe off the paste with cotton on a probe, cleansing the surface

thoroughly, then apply another layer of paste. Wait about five minutes and wipe off the second application as was done with the first, then apply a third thick layer of the paste and this time let it dry. A hard crust is formed and the skin for a considerable distance around the application will become reddened from hyperemia due to the irritation. The following day remove the piece of adhesive plaster, when there will be found a solid crust where the paste was applied. Do not make any further applications and let the crust formed by the sulphuric acid and soapstone remain. Nothing should be used locally on the sore, and eventually the crust will drop off. Where the application has been made to a small surface, it will probably be found when the crust separates that the sore has entirely healed underneath. If applied to a large surface, however, only a portion may have healed by the time the crust separates, and if an unhealthy condition is noted in the unhealed portion it is advisable to reapply paste as before. It will seldom be found that more than one application is necessary.

Michell's paste is probably one of the best means of local cauterization that can be employed, provided there is no objection to the depth to which the caustic is likely to burn. The depth of cauterization by this means cannot be regulated, and this feature should always be borne in mind. When an epithelioma exists in a location where deep cauterization would be inadvisable, Michell's paste should not be employed for the reason stated.

Bougard's Paste.—

Wheat flour, Starch,	āā.....	15,0	℥ss
Arsenous acid		0,32	gr. v
Red sulphid of mercury, Hydrochlorate of ammonia,	āā.....	1,16	gr. xviii
Bichlorid of mercury.....		0,13	gr. ii

Mix in mortar and add five ounces of hot water, half an ounce of chlorid of zinc and five grains of hydrochlorate of cocain. Spread on a cloth or adhesive plaster about ⅛ inch thick. Apply it to the part affected and leave it in place for about twenty-four hours. Considerable pain and swelling ensue and a slough comes away in about four days. Sometimes a second application is necessary. After the slough separates, any mild dressing will do. If the parts are dry, they should be abraded before applying the paste.

Marsden's Paste.—

Arsenous acid	1 part (or 2 parts)
Powdered gum acacia.....	1 part

Mix with water to make a thick paste.

If deep destruction of the tissue is necessary, the stronger mixture is to be used. Spread a thick layer over the area to be destroyed and a little beyond the border. Leave in position eight to twenty-four hours or until a white eschar is produced and dress surgically. The slough will separate in five to eight days, leaving a healthy granulating wound. Repeat if necessary. If cancer nodules are covered by epidermis the latter must be denuded by curettage or caustic potash before applying the paste.

Arsenic and Charcoal Paste.—

Arsenous acid	2 parts
Powdered charcoal	1 part

Water sufficient to make into a paste. It is used in the same manner as Marsden's paste.

Treatment of Superficial Cancer With Salicylic Acid.—The growth to be destroyed is covered with powdered salicylic acid which is kept in place by a gauze dressing. The crystals unite with the growth tissue to form a gray tenacious eschar which drops off spontaneously. The pain is not very severe. Treatment may extend over several months, according to the depth of the new growth.

Liquid Air and Carbonic Dioxid Snow for Destroying Epithelio-mata.—

(a) *Liquid Air* (as applied at the Vanderbilt Clinic, New York City):

A long slender, but solid, wooden stick or a spatula, is firmly wrapped with cotton at the end, dipped into the liquid, and the excess is jerked away upon the floor where it evaporates at once with a slight noise. The applicator is then pressed with more or less forcible pressure upon the point which is to be treated. The freezing action, instantaneously following, extends to a variable depth, according to the degree of pressure. The place becomes solidly frozen and slowly thaws out again, a visible inflammatory reaction appearing a short time later, under a slightly burning sensation. A solidly adherent scar forms in the course of the next few days, and must not be disturbed under any circumstances; it has to remain until it drops off spontaneously—within 10 to 20 days, according to the depth of the action. The results obtained and the necessity for a repetition of the application cannot be determined until that time. The pain caused by this mode of treatment appears to be very inconsiderable.

(b) *Carbonic Dioxid Snow.*—The bougie of snow having been carved to the proper shape, it is applied with moderately firm pressure upon the part to be treated for thirty or forty seconds. An assistant holds the watch and calls off every five or ten seconds. During the first five seconds the patient has a burning sensation but the cold soon abolishes all feeling. When the snow is removed, the skin is white, deeply indented and frozen

hard. After two or three minutes the blood returns to the part and with it a stinging pain, which may last a quarter of an hour. A wheal arises, followed in two or three hours by vesiculation. Twelve hours later, the blister breaks, and the surface is covered with yellow crusts. The next day the crust turns black and in about ten days separates leaving a clean smooth surface. No dressing is required.

The cases suitable for treatment with carbon dioxid snow are pigmentary and hairy moles, and port wine marks. It has been used with success in a case of superficial epithelioma.

Treatment by Injections into the New Growth

Coley's Treatment for Sarcoma.—Late Results of the Treatment of Inoperable Sarcoma by the Mixed Toxins of Erysipelas and Bacillus prodigiosus.—William B. Coley learned early in his investigations that it is extremely difficult to produce erysipelas at will, and that the curative properties of erysipelas are derived, at least in a measure, from the toxic principles of the streptococcus. There is danger, too, in the use of artificially produced erysipelas. The destructive effects of the erysipelas toxins are greatly increased by the prodigiosus toxins. The results of this treatment vary greatly with the preparations used. In certain cases the toxins introduced into the blood serum so increase its resisting or destructive properties that it more than counterbalances the proliferating energy of the tumor cells. These cases often end in permanent cures. But in the majority of cases the action of the toxins is never equal to the task and life is eventually destroyed. Dr. Coley thinks that results justify the routine use of the toxins after all primary operations for carcinoma as well as for sarcoma. He also believes that in nearly all cases of sarcoma of the extremities it is justifiable to give the toxins a trial before resorting to operation. In twenty-six personal cases the patients were alive and well from three to thirteen years after treatment. All of these cases were beyond operation and were considered absolutely hopeless and beyond treatment by any hitherto known method.

Dr. Coley gives the following directions for using his mixed toxins:

It is most important to begin in every case with a very small dose, not over ¼ minim (diluted with a little boiled water to insure accuracy of dosage). If the tumor in question is highly vascular, it is wiser to begin the injections remote from the same, until the susceptibility of the patient to the toxins has been ascertained. This varies considerably in different individuals. After a few doses it is safe, in most cases, to inject into the tumor itself.

As a rule, when giving injections into the tumor, only about one-fifth of the dose used for injections remote from the tumor is required to produce the same reaction. The dose should be increased by ¼ minim when given into the tumor; by ½ minim when injected remote from the tumor, until the desired reaction is obtained. The best results are obtained by doses sufficiently large to produce severe reactions, say a temperature of 102° to 105°.

The frequency of the injections must depend entirely upon the strength of the patient, some being able to bear daily injections, while in others it may be unwise to push the treatment beyond three or four injections a week.

In the successful cases the effect is usually very promptly noticeable. The tumor becomes smaller in size, much more movable, and very much less vascular. These changes appear very quickly, often within two to three days.

The action of the toxins is both local and systemic. Sometimes the best results are obtained by giving the injections alternately into the tumor and remote from the same. In tumors in inaccessible regions, *e.g.*, intra-abdominal sarcoma, or sarcoma of the tonsil, a perfect cure may be obtained entirely by systemic injections.

Potassium Bichromate Injections.—J. Fenwick reports 22 cases of cancer treated by the use of injections of potassium bichromate into the substance of the tumor. The dose used was from 7 to 10 minims of a saturated solution; in some cases 15 minims were injected. The results obtained were excellent, especially in cases of rodent ulcer and epithelioma. The method is simple and inexpensive. Rodent ulcers can be removed with great ease without the patient's losing a day's work.

Orthocoumarate of Sodium Injections.—The drug recommended [1] is the orthocoumarate of sodium in a 22 per cent solution in water, injecting 25 minims subcutaneously up to thrice weekly. In addition to this is given either cinnamic aldehyd in doses of one minim in capsules three times daily after meals, or 5 grains of acetylocoumaric acid administered in a similar way. In addition is added antimony oxid (pulvis antimonialis) in one grain doses with the view of applying a destructive agent to the growths. Plasters have also been used containing oleate of copper, an ointment of this remedy with equal parts of thorium oleate; also ovules of the same for insertion in the rectum and vagina.

Painless Injections of Atoxyl for Malignant New Growths.—

℞	Novocain	0,1	gr. 1½
	Atoxyl	1,0	gr. xv
	Aquae	10,0	ʒiiss

Inject 10 to 15 drops every other day.

Chemical Extirpation of Carcinoma of the Breast.—Dr. C. W. Strobell of New York claims good results in inoperable cancer of the breast by means of chemical extirpation of the growth with potassium hydrate followed by a mixture of zinc chloride, sanguinaria and charcoal.

Colloidal Copper in Cancer.—The name of the colloids has been given by Graham to substances which do not pass or filter through animal membrane. The action of various metallic colloids such as electro-argol, electro-aurol, electroplatinol, electroselenium, electrocuprol, etc., has been studied.

The intravenous administration of colloidal copper solution has been

[1] Authority for this treatment is unknown to the author.

suggested by Leo Loeb. Thirty milligrams of colloidal copper are dissolved in one liter of sterile distilled water. Of this solution 200 to 500 grains are given daily for about twenty days. No satisfactory results have been reported.

Trypsin Injections.—In the early stages of epithelioma and rodent ulcer trypsin injections may be made directly into the diseased tissue. This preparation is non-toxic and requires accurate dosage.

Serum and Cancer-Extract Treatment.—A series of observations have been made upon the lytic action of serum taken from cancer patients upon normal red blood cells, also as regards the flagellation of lymphocytes under the influence of cancer serum.

Ascitic Fluid.—Ascitic fluid from cancer patients has been employed hypodermically as a curative agent by the late Dr. Hodenpyl, of New York.

Fluid obtained by blistering a cancer patient with cantharides has been used hypodermically twice a week (10 to 20 c.c.) with a view of arresting cancer growth, and favorable results have been reported.

Vaccines.—Vaccines have been prepared from extirpated tumors and inoculated against recurrence.

Tumor Extracts.—Tumor extracts have been prepared and employed clinically, and all without noteworthy curative effect.

Internal Secretion Treatment.—Under the assumption that the failure of some internal secretion plus traumatism, is a factor in cancer production, various ductless gland extracts have been administered.

The *fluid extract of sheep's thyroids* in the treatment of cancer has been recommended by Dr. Am Ende, of New York City.

Non-operative resources must find a wide field in inoperable cases and in the prevention of relapses. Statistics show that bad cases may be improved and that a considerable proportion of doubtful cases may actually be cured by intensive and prolonged therapy.

Palliative and Symptomatic Management

Pain.—Chloral Hydrate.—In gastric cancer chloral hydrate in 10 to 20 grain doses (0,6 to 1,3) may be given by mouth as often as is necessary.

Morphia Sulphate.—Morphia sulphate in ¼ to ½ grain doses (0,015 to 0,03) is best administered hypodermically directly over the seat of pain. If Magendie's solution is prepared with boric acid water instead of with plain water and preserved in a blue bottle, it will keep longer and not give rise to induration and abscess at the site of the puncture. In hopeless cancer cases the dose of morphia must be increased in order to be effective.

Aspirin.—In inoperable cases of cancer where there is pain a trial

should be given to aspirin before having recourse to morphin. Fifteen grains, two or three times daily, may be administered.

Conium Poultice.—In incurable breast cancer the old-fashioned conium poultice is a soothing application. This may be made from the fresh leaves, or one-half ounce of the succus conii may be added to an ordinary breast poultice.

Suppositories.—In cancer of the lower intestine or pelvic region suppositories are serviceable:

℞			
	Extract opii	gr. ½	0,03
	Extract belladonnae	gr. ½	0,03
	Butyr. cacao	gr. x	0,6

Selenium as an Analgesic.—As a substitute for morphia, selenium preparations may be given internally and externally in the shape of an ointment, to relieve pain.

Vomiting.—Vomiting is occasionally a most distressing symptom, particularly in gastric and in pancreatic cancer. When stomach washing is hazardous or fails to afford relief, the following prescription is useful to check vomiting:

℞			
	Tinct. jodi	1,0	gr. xv
	Aquae menthae	50,0	℥xiv
	Syrup	10,0	℥iiss

Dressing of Raw Surfaces.—Raw surfaces may be dressed with mercuric bichlorid solution—1 to 2,000—and with Peru Balsam.

Foul-Smelling Secretions.—Irrigation with antiformin (1 to 20) will deodorize and cleanse fetid wounds.

Diet in Cancer.—As the normal sulphur metabolism is upset in malignant disease, the adoption of a vegetarian diet with the addition of proteins having a low percentage of sulphur would appear rational, to wit: halibut, salmon, white fish, mackerel, cod, herring, shad, blackfish, porgy, cheese, butter, cream, egg (yellow).

Vegetables and Salads.—Rhubarb, beets, chicory, pumpkin, lettuce, beans, peas, romaine salad.

Cereals.—Wheat, oatmeal, rice, corn, rye, barley, buckwheat, graham bread.

Fruits.—Nuts, almonds, oranges, plums, olives, huckleberries, strawberries, apples.

Specimen Diet

Breakfast: Tea or coffee with sugar and cream (not milk, on account of the lactalbumins), little bread with much butter, fresh or cooked fruit.

Dinner: Soup, of fruit or cereals or vegetables (not meat broths),

peas, lentils, beans; for change, meat—two ounces at the most, purée of potato, dumplings, edible roots (carrots, beets), boiled or preserved fruits, rice, salads.

Supper: Fruits with rice, potatoes with butter, salads.

The nourishment should be plentiful. The necessary quantity of casein, one or two ounces, can be mixed with butter and used with the various meals. The casein can also be added to the various soups, purées of potatoes, and to the dishes of vegetables during the process of cooking. In order not to cause any aversion of the patient to the casein, it must be absolutely pure and tasteless. A flavoring addition to the casein of stewed tomatoes and the like is also permitted. The casein may also be given in the form of a medicament, in dry powder, in one-half to two dram doses, every three hours, between meal times, and is best taken down with a swallow of water.

For Cancer Diet, *see also* Section I.

Prophylaxis and Treatment of the Usual Clinical Forms of Cancer

Malignant new growths have the same range in the human body as have tuberculosis and syphilis: they are encountered in all tissues and organs of the body.

External Cancer

Skin and Mucosa

External cancer is more frequent in males than in females. The most frequent sites are the nose, cheek and the lips.

Lupus vulgaris, x-ray dermatitis, psoriasis plaques, are occasionally found complicated by cancer.

Special Prophylaxis.—Special prophylaxis in external cancers involves avoidance of chronic irritation and removal of precancerous conditions; ulcers and fissures must be treated until healed or must be excised. Irritation from carious teeth and dental plates should receive prompt attention. Warts and moles in elderly people, particularly dark pigmented moles, had better be excised. Undue pressure from clips and bridges of eyeglasses and from trusses and corsets should be avoided.

Treatment.—Treatment is by excision, curettage, cautery, caustic paste, fulguration, x-rays, radium, carbon dioxid snow, etc.

Epithelioma properly treated shows a high percentage of cures.

From the statistics of 417 cases furnished by Doctors Bulkley and Janeway [1] we find the largest number of cases between the ages of 30 to 80 years.

[1] *Med. Rec.*, March 21, 1908

Location of Epithelioma

Location	*Male*	*Female*	*Total*
Multiple	20	6	26
Nose	77	51	128
Cheek	66	28	94
Lower lip	32	..	32
Forehead	6	13	19
Temple	8	8	16
Eyelid	8	7	15
Tongue	11	2	13
Ear	11	2	13
Neck	7	1	8
Breast	..	8	8
Upper lip	2	5	7
Genitals	3	3	6
Body	3	2	5
Gums	4	..	4
Inside cheek	4	..	4
Inside mouth	1	2	3
Chin	3	..	3
Tonsil	1	1	2
Scalp	..	2	2
Extremities	2	..	2
No location specified	5	2	7
	274	143	417

Duration of Treatment

Cases untreated	45
Duration uncertain or still under treatment	138
Operative cases	38

Cases receiving local treatment, including x-ray—

3 months and under	69
3 " to 6 months	43
6 " " 9 "	13
9 " " 12 "	19
12 " " 2 years	6
2 years and more	46
	417

Duration of x-ray cases (included in the above)—

3 months and under	29
3 " to 6 months	12
6 " " 9 "	4
9 " " 12 "	2
12 " and over	6
	53

Carcinoma of the Breast

It is estimated that about eighty per cent of all breast tumors are cancerous and that ten per cent of benign tumors tend to malignancy. The frequency of occurrence of mammary cancer increases as the fortieth year is approached; it is highest from forty to fifty; it decreases in frequency towards the age of sixty-five; and becomes a rarity at the age of seventy. A history of traumatism is frequently elicited.

Symptoms.—The first evidence of the disease is the tumor with its defined borders. The indurated part is not movable in the surrounding tissue. The nipple is frequently retracted; the skin over the tumor is adherent and pitted. Simultaneous involvement of both breasts is rare. Pain is not an early sign. Atrophy of fat and a flattening of the superimposed region is an early sign. When a benign tumor of long standing suddenly takes on rapid growth, the suspicion of malignancy becomes strong.

Diagnosis.—When glandular enlargement is in evidence and lues can be excluded, the diagnosis of "cancer" is almost certain. All the aforementioned characteristic signs are present in *scirrhus.* In adenocarcinoma the nipple is not retracted but the glands in the axilla are enlarged. Carcinoma of a supernumerary breast found in the axilla or elsewhere is occasionally observed.

Chronic suppurative mastitis dating from the last confinement is occasionally mistaken for cancer. An aspirating needle will reveal pus in such cases. Chronic suppurative mastitis and cancer have been observed in the same breast. Wylie and Crile have drawn attention to the question of hemolysis as an aid in diagnosis in questionable cases.

Special Prophylaxis.—Special prophylaxis involves the avoidance of irritation from an ill-fitting corset. When the breast has suffered a blow or a contusion and an acute induration develops in consequence, mild massage and vibration are indicated with a view of dispersing the swelling. Precancerous conditions such as cysts and lumps can be extirpated without sacrificing the entire breast. The writer has known lumps to disappear from the breast during lactation after the first pregnancy.

Treatment.—Disappearance of primary and recurrent mammary carcinoma after *removal of the ovaries* has been reported, and this possibility should be considered in cases in which nothing better can be offered. The best treatment at the present time is the radical operation.

As regards end results the conclusion of Dr. E. S. Judd covering six hundred and eight cases from the Mayo clinic are of interest:

(*1*) Results in operations for cancer of the breast were as good if not better than results in operations for cancer elsewhere. (2) The prognosis in younger people who received the benefit of an early operation was better than they had

expected. (3) The prognosis was variable in a certain per cent. An extensive external involvement might give a fair prognosis, while a slight external lesion might terminate early from internal metastasis. (4) That metastasis might occur many years after the operation, though in the great majority of instances they would appear in the first few years, if at all. The difference between the percentage of patients living over 3-5 and 10 years was not as great as might be expected, but this was because most patients who died of the disease died within the first 3 or at least the first 5 years. Five years without recurrence meant a very small probability of trouble after that. (5) Comparing these results with those of former years they felt that the results were improving, and that the improvement seemed due to the fact that patients were coming earlier rather than to any improvement or change in the technic.

Cancer developing during pregnancy or during the lactation period is to be treated on similar lines.

The management of inoperable cancer is discussed under General Treatment.

Tumors of Male Breast

Carcinomata and sarcomata of the male breast have been reported but are exceedingly rare.

Cancer of the Digestive Tract

Cancer of the mouth, tongue, jaw fauces, tonsils, etc., is not rare. Early operation, and in some cases supplementary general treatment, is indicated.

Cancer of the Mouth and Throat

Meller reviews and classifies 207 cases of carcinoma of the mucosa of mouth and throat in which an operation was performed in the second surgical clinic at Vienna, 1894 to 1904 (Gussenbauer and Hochenegg). This material shows that any part of the mouth can be the seat of the cancer, and that men are affected fifteen times oftener than women. Those who frequent saloons, he asserts, seem to show a special predisposition to the disease, but syphilis and smoking a pipe do not seem to enhance this tendency. The affection generally runs a fatal course in two years. The submaxillary glands are almost always involved and, exceptionally, other glands. The involvement of the glands can generally be determined at an early stage of the disease. A positive histologic finding in the glands is not absolutely unfavorable for the prognosis. The development of metastases at a distance at the time of the operation is a rare occurrence. The results of operation depend on the size of the tumor. Recurrence was observed in 79 per cent of the surviving patients, but permanent recovery sometimes followed a second operation. The lower in the throat, the more unfavorable the prognosis of the carcinoma. The general mortality of the operation was 13 per cent, but 14.6 per cent of the 207 patients were cured.

Cancer and Stricture of the Esophagus

When diagnosed and resected very early, cancer of the esophagus is not as rapidly fatal as formerly. Dr. F. J. A. Torek, of New York, has the first successful case to his credit. The patient was sixty-seven years old and the tumor was situated just below the arch of the aorta.

Regarding prophylactic measures against cancerous conditions of the *mouth and esophagus* the reader is referred to General Principles of Cancer Prevention in the forepart of this article.

Cancer and Ulcer of the Stomach

(*a*) **Cancer of the Stomach.**—Cancer of the stomach is a common malady: nearly one-half of the carcinomata concern the stomach.

According to the statistics of Haeberlin, among 27,511 deaths from cancer in general, 11,422 cases, i. e., 41.5 per cent, were gastric cancers. This figure agrees approximately with the statements of d'Eopiue, according to whose calculation 44.3 per cent of all carcinomata concern the stomach. Virchow calculated the frequency of gastric cancer, as compared to cancer of other organs, as 34.9 per cent, upon the basis of the Wurzburg autopsy material of the years 1852-1855. The latest statistics, as compiled by Reiche,[1] show gastric cancer to participate in the total number of deaths from cancer with 50.2 per cent in men, and 29.1 per cent in women.

In a study of 566 consecutive operatively and pathologically demonstrated cases of cancer of the stomach Dr. Frank Smithies, of Chicago, comes to the following conclusions:

1. A number of cases clinically admitting only a diagnosis of chronic gastric ulcer are shown to be malignant at operation. Many cases of gastric cancer reveal a "precancerous" history which at any stage prior to the terminal period of malignancy satisfies the clinical symptom complex of chronic gastric ulcer.

2. A study of 566 consecutive cases of gastric cancer, operatively and pathologically demonstrated, has been made in the attempt to determine how frequently chronic ulcer precedes gastric cancer and how this change is manifested clinically.

Clinical Consideration.—The sex ratio in gastric cancer is approximately that of chronic gastric ulcer (3.1 males to 1 female). More than three-fourths of the cases of gastric cancer occur in persons between the ages of 40 and 70 years; more than one-half those of chronic gastric ulcer (134 cases) between the ages of 40 and 70. A family history or one of blood relationship of gastric cancer existed in 9.2 per cent—a history of tuberculosis in 1.2 per cent.

Precancerous history indicates that 41.8 per cent of proved cases of gastric cancer presented early symptomatology of chronic gastric ulcer; 18.7 per cent showed the early symptomatology of "irregular" gastric ulcer, and 32.1 per cent of the cases had the symptom-complex of gastric cancer, without previous gastric malfunction. Thus in more than 60 per cent of the cases of gastric cancer the

[1] *Deutsch. med. Wchschrft.*, 1900.

patients had previous dyspeptic history and this history was generally that of chronic gastric ulcer.

The length of time of all symptoms of the "primary" cancerous group (182 cases) was 7.1 months. The average length of time of the precancerous dyspeptic period in 239 cases was 11.4 years. In this group the supervening period of evident malignancy averaged 6.1 months.

Development of precancerous history permits patients coming to laparotomy at a stage when in more than one-half of the instances surgical advantages of a localized process are available. In about one-fifth of the cases of "primary" gastric cancers, ulcus carcinomatosum is demonstrated operatively.

Significance of Clinical Symptoms.—Periodicity: In 81 per cent of the cases in which prolonged dyspepsia had preceded cancer, periodicity of symptoms was noted in that stage, while in 99 per cent of the cases periodicity was absent when the process became evidently malignant. In but 4.8 per cent of 182 cases of "primary" cancer were there periodic attacks of distress.

Types of Pain.—Nearly one-fourth of the patients in whom dyspepsia preceded malignancy had prostrating pain (colics, etc.), while only about one-fifteenth of the patients with "primary" cancer exhibited this type of distress. Opiate relief was required in 6.5 per cent of the former class and in 2 per cent of the latter.

Food ease of pain was present in more than one-fifth of the cases in which malignancy followed clinical chronic gastric ulcer and in 3.2 per cent of the "primary" cancer group.

Hemorrhage.—Melena or hematemesis was noted in 17.1 per cent of the cases. Of the group styled malignancy following ulcer, hemorrhage occurred in 2.9 per cent; in the "irregular ulcer" group before malignancy, in 19.5 per cent and in "primary" cancer group 16.5 per cent. Of patients bleeding within two years before coming under observation, more than three-fourths fell in the ulcer-before-cancer classification.

Hemoglobin estimation was rather higher in the primary cancer group than the ulcer-preceding-malignancy class.

Vomiting was observed in more than 57 per cent of the cases of gastric cancer. More than 40 per cent exhibited delayed vomiting. Of the entire group, 15 per cent gave a history of dark or "coffee-ground" vomit.

Nearly three-fourths of the cases of gastric cancer exhibit abdominal tumor or ridge. This is present in nearly two-fifths of the cases of "primary" cancer and more than three-fifths of the cases in which ulcer preceded malignancy clinically.

In more than one-fifth of the cases in the "primary" cancer division and in about one-ninth of the cases in the non-primary group, metastases were demonstrated before laparotomy.

Test-Meal Findings.—Delayed gastric emptying power was evidenced in nearly two-thirds of the cases in the primary cancer class and in nearly three-fourths of cases in the non-primary division.

Acidity.—In 55.4 per cent of primary gastric cancer cases free hydrochloric acid was absent; in 11.5 per cent it was between 20 and 50.

In the non-primary cancer class free hydrochloric acid was absent in 49 per cent and in 20 per cent it was between 20 and 50.

Lactic Acid.—This is more commonly noted in the primary cancer group than in the non-primary division.

Occult Blood.—This is rather more frequently demonstrated in the non-primary cancer class than in the primary cancer group.

Oppler-Boas Bacilli.—These were demonstrated in 93.8 per cent of cases of gastric cancer by the differential agar-stain method.

Glycyltryptophan Test.—This was positive in 40 per cent of the cases (141). The *hemolytic* reaction was positive in 47.2 per cent. of the cases (31). The *formaldehyd titration index* was uniformly higher in gastric cancer and ulcera carcinomatosa than in other gastric ailments. The estimation of soluble albumin by the *Wolff-Junghaus test* was more uniformly positive in cancer and carcinomatous ulcer cases than other forms of gastric disturbance.

Röntgen-Ray Evidence.—In about 10 per cent of the cases of gastric cancer evidence returned by fluoroscope and röntgenogram is of distinct value in making absolute diagnosis of physically inaccessibly located cancers.

(*b*) **Polyadenoma and Ulcer of the Stomach.**—Polyadenoma and ulcer of the stomach create a predisposition for cancer. These adenomata generally appear in the shape of polypoid growths in any part of the stomach.

Ulcer and Cancer of the Stomach: Their Relationship.—C. Graham [1] presents the following conclusions based on clinical experience. (1) The great majority of gastric ulcers are located at the pyloric end. The immediate pylorus comes first, the lesser curvature second. A small per cent is found elsewhere, few at the cardia. (2) The great per cent of cancers of the stomach is found at the pylorus and lesser curvature (pyloric end), that is, the same locations find the greatest number of each. (3) Quite a per cent (50-60) of patients suffering from carcinoma gives three or more years of a precancerous history. (4) A growing per cent of cancer cases are found with short histories and ulcer demonstrated as the earlier lesion. (5) A certain per cent, if small, of short ulcer histories leading to acute pyloric obstruction where the ulcer must have been present for quite a period, and latent. (6) Ulcers may be present for an indefinite period and no symptoms follow until obstruction, perforation, and hemorrhage appear, if the acidity is low or absent and the ulcer locates itself along the lesser curvature or near the pylorus. (7) Cancers may develop under the same gastric conditions and only manifest themselves when obstruction or systemic poisoning makes itself felt. The present need in medical practice is the establishment of earlier and better diagnosis of these two conditions.

Association of Malignant and Benign Processes.—Malignant ulcer and apparently non-malignant duodenal ulcer are occasionally associated and simple and malignant ulcers have been found in the same stomach.

Gastric Cancer and Pernicious Anemia.—Progressive pernicious anemia is secondary to cancer, but not infrequently cancer is overlooked and the anemia is looked upon as a primary blood condition. Primary idiopathic progressive anemia is losing ground as a morbid entity.

In the majority of cases chronic gastric indigestion not cured by diet, lavage and suitable medication are due to lesions of the gall-bladder, pancreas or stomach proper, and an exploratory laparotomy is in order. Only

[1] *Boston Med. and Surg. Jour.*, Aug. 31, 1905.

when gastric carcinoma is operated upon in the precancerous stage may we expect a cure. Gastro-enterostomy is the operation of choice for patients with advanced gastric carcinoma.

Primary Sarcoma of the Stomach.—This is comparatively rare. It has less tendency to involve the gastric mucosa and is in evidence more as an infiltration of the muscular walls.

Simultaneous Carcinoma in Stomach, Ovaries and Uterus.—Schenk and Sitzenfrey report three cases of primary carcinoma in the stomach, ovaries and uterus. The evidence showed in one case that the gastric cancer had broken through the serosa and cancer cells had been scattered through the peritoneal cavity. In one of the cases examination of the chemistry of the stomach revealed nothing abnormal—the gastric cancer in this and similar cases escaping all diagnostic measures. Metastatic affections in the uterus are liable to occur with secondary as well as with primary ovarian cancer. In conclusion they affirm that the results of operations for stomach and intestinal cancer would certainly be better if surgeons made a practice of removing the ovaries in all such operations, even when they appear sound to the eye. His three patients were women of forty or sixty.

Cancer of the Intestines

All types of malignant neoplasms are encountered in the intestinal tract. The symptoms vary with the site at which the growth occurs. When the *duodenum* is involved the symptoms are largely stomachic indigestion, loss of appetite, eructations, nausea—vomiting, pain in the epigastric region, irregular bowel action, griping and desire to go to stool without efficient result, anemia, loss of weight, cachexia. When a tumor is felt the disease is far advanced. Cancer of the *jejunum, ileum* and *colon* and *upper sigmoid* have practically the same symptoms, namely, griping and a tendency to diarrhea. If the stools show blood from the small intestine it is more black and disintegrated than red. Pus may be found in the stool. Palpable tumors are movable. Cachexia is pronounced.

Cancer of the Appendix.—Cancer about the appendix gives symptoms of chronic appendicitis.

Cancer of the Rectum.—When the rectum is involved the patient usually passes blood, pus and mucus in the stool and is constipated. A careful examination with the finger, the proctoscope and sigmoidoscope will reveal the nature of the ailment (ulcer, tumor), in which event we must differentiate between syphilis, tuberculosis and malignancy. In the upper intestine it is much more difficult to make a differential diagnosis without an exploratory operation.

The prognosis in cancer of the intestine is hopeless without early surgical interference. In advanced cases and with glandular involvement and

metastases, anastomosis of free segments of the intestinal tube gives relief from distressing symptoms of irritation and obstruction.

Carcinoma of the Omentum and Peritoneum.—This condition is rarely primary and usually secondary and does not call for special management.

Cancer of the Pancreas

Deep and agonizing pain, resembling gastric crisis of tabes is a pronounced symptom in cancer of the pancreas, together with tenesmus, a sensation of constriction about the waist and emaciation. A tumor is rarely palpable, jaundice and glycosuria and fat diarrhea may not be in evidence. The symptoms differ somewhat as regards the head and body of the pancreas. The pancreatic secretion obtained by means of the duodenal tube may show normal conditions. In suspicious cases an exploratory operation is justified and a resection or extirpation of the gland if a new growth is present.

Treatment.—Treatment otherwise is palliative.

Primary Carcinoma and Sarcoma of the Liver

These are rare affections. In 11,500 autopsies at Guy's Hospital, London, during the years 1870 to 1893, there were but eleven cases. It appears as a massive development or as a nodular growth.

Cirrhosis and carcinoma may coexist. The clinical histories in a hundred and forty-seven cases collected by Eggel showed jaundice in 61 per cent; ascites 58 per cent; enlarged spleen 32 per cent; edema of extremities 40 per cent; fever 14 per cent. Anemia, emaciation, cachexia, come on gradually. The average duration after the development of cancer proper is about six months.

Treatment.—When in the case of hepatic tumor, lues or abscess or echinococcus have been excluded and the exploratory laparotomy reveals a single primary tumor its removal may be attempted. Secondary and multiple tumors should be left alone. *Sarcomata* may be treated with Coley's toxins. *Morphin will relieve pain.*

Carcinoma of the Gall-Bladder

This usually gives a history of gall-stones; thus, the operative removal of very annoying gall-stones in elderly people *may prevent an outcropping of malignancy.* Excision of the gall-bladder is feasible in circumscribed cancerous degeneration. Palliative treatment is the same as in other cancers.

Cancer in the Genito-Urinary Tract

Malignant new growths of the kidney, ureter, bladder, urinary tract, are not rare—pain, hematuria, and pyuria being the main symptoms. In

how far concretions and large calculi are an exciting factor is not definitely known.

The side on which a tumor is located can be made out by the subjective symptoms or proven by an instrumental examination and a study of the segregated urine from either side. An x-ray examination may aid in our diagnostic inquiry. Radical excision is indicated provided the other side is known to be intact or functionating. Considerable interest is attached to malignant tumors of the renal region in infancy and childhood because of the feasibility of radical extirpation. Embryonic adenosarcomata are clinically characterized by rapid growth and by a tendency to metastases.

FIG. 93.—LARGE CYSTOSARCOMA OF RIGHT KIDNEY.

A second class of tumors appears to take origin in *suprarenal* and *perirenal* tissue and retroperitoneal glands, secondarily involving the kidney. These tumors do not grow rapidly but they also show a tendency to metastatic dissemination. The extirpation of such new growths can enter into consideration only when metastases are not in evidence. The percentage of cures is about five per cent.

Coley's toxins and x-ray or radium exposure should be tried. Medical treatment in these cases is of no avail.

Cancer and Sarcoma of the Male and Female Bladder

These have been treated of late by fulguration, the flat electrode being placed upon the skin over the sacrum and the spark electrode introduced through a suprapubic incision.

Carcinoma of the Prostate

This is a not uncommon disease, existing in about one-seventh of the entire number of cases of prostatic enlargement in men over fifty. Induration and pain are common, and aid the early diagnosis. The growth is often slow, confining it within the limits of the firm prostatic capsule for a long period. Every indurated, enlarged prostate should be suspected, and a perineal operation advised, when, if malignancy be discovered, the radical operation can be resorted to.

Operation includes the excision of the entire prostate with its capsule

and urethra, and the adjacent portion of the bladder, the seminal vesicles, and the ampulla of the vasa deferentia.

Cancer and Sarcoma of the Testicle

These may exist in a dormant state for years and suddenly take on a very rapid growth. When syphilis has been excluded radical extirpation should be done.

In *cancer of the penis* fulguration, x-rays, actual cautery, and amputation are called for.

Cancer of the Uterus and Ovaries

Hemorrhage after the menopause is the symptom which should bring the patient to the physician and the physician to a realization of his responsibilities and duties in the matter.

Dr. J. H. Boldt, of New York, presents the case in its proper aspect when he states:

> The family medical advisor must be urged to realize that, in all instances in which there is a well-founded suspicion of cancer his obligation to the patient is to ascertain by all diagnostic means at his command that *cancer is not present* rather than to affirm a cancer diagnosis.

Uterine Myomata and Malignant Disease.—T. S. Cullen calls attention to the danger of incomplete examinations after hysteromyomectomy as regards the possible existence of malignant disease. He has been surprised to find how frequently myoma is associated with carcinoma in the large experience at the Johns Hopkins Hospital, and in 1903 he advised opening the uterus immediately on its removal to ascertain whether or not by any chance carcinoma of the uterine body existed, and he now recommends not only the careful examination of the uterine cavity, but also of the myomatous nodules. As an illustration of this, he reports a case of supravaginal hysterectomy supposedly for simple interstitial and subperitoneal myomata. Two years later sudden collapse occurred, due to hemorrhage from sarcoma of the cervical stump. Reëxamination of the original tumor showed typical sarcomatous changes of the myoma. The patient died eight months after a second laparotomy and about two months after progress of the growth had necessitated an operation for obstruction of the bowels. The case, he says, clearly indicates that physicians should examine carefully, not only the uterine cavity, but also the myomata, before the cervical stump is closed.

Prophylaxis in Cancer of the Genito-Urinary Tract

The key to the cancer situation not having been found as yet, precancerous conditions are suspected, but not proven. Erosions and granu-

lations frequently heal under appropriate treatment, but sometimes they persist. If tuberculosis and lues can be excluded and if the microscopic picture suggests malignancy, radical measures should be employed. Cysts, fibroids and polypi should be extirpated. Amputation of the cervix for so-called benign conditions have no doubt prevented malignant degeneration in many instances.

Treatment of Cancer of the Genito-Urinary Tract

The radical operation by the abdominal route by knife and cautery, removing and destroying the new growth and infiltrated adjacent connective tissue and glands, offers the best chance for cure or prolongation of life.

In *recurrent cancer* the actual cautery has given good results (*vide infra*). All other forms of treatment elsewhere discussed may be tried.

Hemorrhage is controlled by the actual cautery or by tampons saturated with a strong solution of alum in water.

Pain is relieved by suppositories of opium and belladonna or by hypodermic morphia injections.

Disinfecting and Deodorizing Douches.—In inoperable conditions douching with liquor sodae chlorinat (1 to 20) or antiformin in water (1 to 20) or other non-irritating chemicals is necessary.

Malignant New Growths in the Respiratory System

Laryngeal, tracheal and pulmonary malignant new growths are not rare. Hoarseness, noisy respiration, dry cough, moderate or severe dyspnea, bloody expectoration, occasionally pain and dysphagia are the usual complaints.

Treatment.—Extirpation of the new growth, tracheotomy for relieving respiratory obstruction, x-ray and radium therapy and inhalations of medicated steam, are all that can be done for such conditions.

Coley's toxins with or without selenium therapy may be tried in sarcomatous new growths. In pulmonary cancer or sarcoma the treatment is symptomatic and palliative.

Malignant Neoplasm of the Central Nervous System

Primary or metastatic, they are in the beginning frequently diagnosed as pure hysteria or neuritis, owing to the paucity of signs and symptoms presented.

Somnolence and motor symptoms are markedly in evidence when the brain is the seat of the disease, and pain and motor inefficiency are the prominent symptoms of spinal involvement. When sarcoma is suspected or can be diagnosed Coley's toxins are indicated (gtt. ss) and in combination with selenium, given internally.

Treatment.—Whenever severe pain or insomnia dominates the situation the narcotic treatment elsewhere recommended must be employed.

Cancer and Sarcoma of Bony Structure

Malignancy of bony structures is less frequent than malignancy of the viscera. We find primary and secondary cancers and sarcomata in the long as well as in the flat bones; also in synarthroses and in the medullary portion of the bone.

Treatment.—Radical surgery in combination with Coley's toxins, x-ray and radium treatment comprise our therapeutic resources in this class of cases.

Miscellaneous Forms of Malignancy

Malignant neoplasms of the circulating organs are rare as shown by autopsy records.

Malignant Degeneration of the Thyroid

Both sarcoma and carcinoma occur in the thyroid gland; they almost invariably occur in thyroids that have undergone goitrous changes, and marked chronicity is a special feature in such cases, as a rule.

Treatment.—Extirpation, Coley's toxins, x-rays, radium, selenium and palliative measures.

Chorio-Epithelioma, or Sarcoma of the Placental Site

This condition occurs only after pregnancy. It grows rapidly, infiltrates the muscularis of the uterus and quickly forms metastases.

Treatment.—Extirpation by the abdominal route and ligation of parametric and spermatic veins is the proper procedure in this class of cases.

Idiopathic Multiple Hemorrhagic Sarcoma

This condition, first described by Kaposi, is characterized as follows:

The disease begins on the feet and hands, in form of reddish-brown or bluish-red, rather firm, soft or spongy nodules, nodes or plaques, or diffuse swellings. By the development of discrete formations it advances along the legs and arms and gradually appears on the trunk, face and mucous membranes. Some of the tumors may undergo involution by atrophying in part or *in toto,* leaving pigmented depressions. Ulceration is rarely observed. The lesions, especially those on the extremities, are, as a rule, painful. In a number of cases horny growths develop on some of the original lesions on the feet. The structures beneath the skin are,

as a rule, not involved. In some cases blebs form over affected skin filled with a clean yellow fluid.

Treatment.—When lues can be excluded arsenic should be given internally combined with x-ray treatment. Coley's toxins may be tried. Malignant tumors (sarcomata) growing from the *orbit of the eye* are occasionally observed. Extirpation, Coley's fluid, x-rays, radium, selenium, are palliative.

Chloroma

Chlorolymphoma—Green Cancer

Neoplasm-like formations are found in almost all the tissues of the body. Clinically we notice exophthalmus due to retrobulbar lymphoma and swelling of temporal and occipital regions with bone involvement, enlargement of spleen and of lymphatic glands throughout the body—severe and progressive anemia causing weakness, fever and emaciation. Tumors removed from the body have a peculiar green color, hence the name chloroma.

Treatment.—The treatment is that of other forms of malignant lymphosarcoma. Two cases with Röntgenologic findings were reported by Drs. Gould and Le Wald at a meeting of the Pediatric Section of the New York Academy of Medicine, February 10, 1916.

Malignant Tumors of the Maxillary Sinus

Primary malignant growths of the maxillary sinus are rare.

In epithelioma one finds swollen cervical glands under the outer rim of the sternocleidomastoïdeus.

At the beginning of the disease two symptoms point the way to an infection of the maxillary sinus, inflammatory changes of the forward wall and purulent discharge from the nose. Later, the symptomatology is dependent upon whether the tumor develops in the mouth, orbit, or the ethmoid labyrinth. Death ensues with great pain either because of hemorrhage or because of inanition.

Treatment.—Treatment consists of surgery, Coley's toxins, selenium.

Röntgen Tumors

Lindenborn reports two cases of Röntgen carcinoma developing under prolonged Röntgen treatment of lupus of ear or face. In one it ran a very malignant course, the patient, a man of 26, was given 79 exposures between February, 1904, and April, 1907. The ulceration developed very rapidly; it was cut out in five months, but recurrence in two weeks required renewed extirpation, and the cancer continued to proliferate, some days increasing by 1 cm. in diameter. The patient died in less than a year after the first symptoms.

The other patient was a man of 59; after 120 exposures in the course of three years a carcinoma developed which was excised, and a year and a half later the patient was entirely well, the skin being healthy with no traces of either lupus or carcinoma. Lindenborn ascribes the Röntgen cancer to injuries of the tissues which it is impossible to avoid in long-continued Röntgen treatment.

Cancer and Fever

Giordano tabulates the details of a hundred cases of cancer in which the temperature was studied; fever was evident in 60 per cent for which no explanation could be found except the cancer itself. In some cases the temperature began to go up in the evening, accompanied by severe headache, and in the course of the night, the temperature dropped, with profuse sweating, and in the morning was a trifle below normal. In other cases the temperature kept high for a week or so, with an intermittent type of fever. In still others the temperature kept throughout of an intermittent type; this was most common with sarcoma; in one case of epithelioma of the uterus the temperature fluctuated according to the quartan fever type. In the majority of cases, however, when the temperature was above normal it kept at an even figure. This continuous type of fever may mislead in the diagnosis unless physicians bear in mind always the possibility of a continuous high temperature in the prodromal period and during the course of malignant disease.

Section VI

Nutritional and Constitutional Derangements; Endocrine Gland Derangements

General Principle of Prophylaxis and Treatment

Man in adult life is the expression of a series of habits of body and mind; thus the prevention and treatment of constitutional anomalies involve the carrying out of principles of reconstruction in their broadest sense. Changes of habit and environment, avoidance of suboxidation and toxemia, selection of proper alimentation, and the induction of normal metabolism by means of physical culture, massage and hydrotherapy are the foundations of reconstructive efforts.

Radiotherapy in constitutional derangements is of value, but it is more adapted for institutional treatment.

We are still in the experimental stage in regard to disturbances known to be due to insufficiency, hypersufficiency or to incoördination of function of certain glandular organs and looked upon as amenable to treatment by means of the administration of preparations obtained from similar glandular organs of animals. Study of the cadaver alone is of no avail. It is only by observation of the living animal that more precise knowledge on the subject will come to us.

With our increasing knowledge of the internal secretions we are learning to appreciate more and more their importance and the great influence they exert physiologically and pathologically. Many conditions which some years ago eluded understanding are now traceable to derangements of one or more of the ductless glands constituting the system of glands having internal secretions—namely, the pituitary body, thyroid, parathyroids, thymus, suprarenals, ovaries, testicles, pineal spleen, and pancreas as well as still others which are thought by some also to have an internal secretion such as the mammary glands, placenta and prostate, regarding which not much is known at present.

Still less is known regarding the causes leading to their derangements. Aside from congenital transmission, the universal tendency to attribute many chronic, ill-defined, little understood and so-called incurable diseases to disturbances of metabolism, with resultant intestinal auto-intoxication and autotoxemia may well be adhered to in accounting for pathological conditions affecting these glands.

Medicine and surgery are far on the road, learning how to avoid injury to organs of internal secretions and how to mend the evil consequences of such injuries. The discovery of the *hormones*—the active principles of organs with internal secretions—is one of the most important in medicine.

Although the use of glandular organs as therapeutic agents dates back to antiquity the study of the hormones is new and their nomenclature, dosage and mode of administration—whether by mouth or by the needle—have not as yet been definitely established.

Constitutional Disturbances and Early Senility

The chances of attaining old age when constitutional diseases threaten are much greater if we live most of the time in fresh country air. Statistics of large cities show an absence of the fourth generation of town dwellers, and the conclusion is inevitable that tenure of life is prolonged by spending a certain amount of time in the country.

The city child is subject to a number of disturbing conditions which undermine the constitution by throwing too heavy a burden on the sense organs, through which exhaustion of the central nervous system follows. Among these conditions are noises, a perpetual round of hurry, and unending sequences of incidents exhausting the attention, to which are superadded the physical discomforts of vitiated air and effluvia from human beings and waste organic products, besides offensive gases and infection-laden dust.

To attain old age we have to relieve ourselves of worry, strains and anxieties, modify our diet, use stimulants in moderation, avoid narcotics, and spend reasonably long periods of time under pleasant conditions in practical retirement. Above all, amusements should be simplified and accepted rather than sought. Vegetable food mostly and little animal food should be eaten.

In all constitutional anomalies a careful quantitative urinalysis may aid us in locating the seat and nature of the underlying faulty metabolism. We may ascertain the tolerance of the organism for protein, fat and sugar and also figure out—by means of newer methods of investigation—the efficiency of secreting organs such as the liver, kidneys, pancreas and of the central organs, such as the heart. By regulating the intake fuel and adjusting the expenditure of force, we may delay a long time the inevitable

breakdown of vital organs whose efficiency becomes diminished by wear and tear as the years go by.

Diatheses in Their Clinical Aspect

Diathesis may be defined as a bodily condition or constitutional anomaly which predisposes to a particular disease. Some diatheses are inherited and others may be acquired; both may be overcome by reconstructive efforts—hence the importance of their clinical consideration.

Asthenic Diathesis.—Asthenia universalis is a term used in connection with individuals who have degenerated physically and show marked dyspepsia and neurasthenia. When born into this condition they represent the sins and mistakes of former generations. Acquired asthenia is the result of a faulty hygiene which frequently dates back to infancy and childhood and by reason of inertia of the individual remains uncorrected as the years go by. What precise rôle the internal secretions play in this class of cases has not yet been established.

B. Stiller, of Budapest, emphasizes the fact that *asthenia universalis* is a widespread constitutional defect in the sense that it depends upon hereditary tendency.

Symptoms.—Its attributes are enteroptosis, nervous dyspepsia, severe disturbance of nutrition without sufficient cause, atony of the stomach without flatulence, intestinal atony, flaccidity of all tissues, neurasthenia.

The tendency shows itself in the atonic habit of the child, delicate skeleton, long flat thorax, oblique ribs, small epigastric angle, and, as a concomitant of the asthenic thorax, looseness of the costal girdle due to congenital defect of the tenth costal cartilage, which produces a floating tenth rib (normally fixed).

Treatment.—Reconstructive efforts in the interest of asthenics can and should be made early and if conditions are favorable for a change of environment from city to country this change should be advised, because asthenic individuals of either sex find city life too strenuous. Asthenic adults and children should wear an abdominal belt or uplift corset.

Scrofulous, Strumous Diathesis.—This form, now sometimes called *exudative diathesis,* is a derangement of childhood. It affects the lymphatic system and shows painless swellings of the lymph glands—especially of the cervical lymph nodes—transparent skin, anemia, geographical tongue, weak musculature, also eczema, milk crust, prurigo and other skin affections, a great tendency to catarrh of the mucous membranes, bronchitis, enlarged tonsils and adenoids, angina and false croup.

The affection is thought to be due to faulty metabolism and faulty assimilation, sometimes overfeeding, auto-intoxication, poor hygiene, etc. It has been suggested that scrofula is the expression of a chronic toxemia of a former generation, without bacillary involvement of the scrofulous

offspring (as in tuberculosis or in syphilis). Not infrequently, apparently well-nourished infants present the symptoms of scrofula in a marked degree. In fact there are two types of scrofulous children, one group is thin and undernourished, the other is fat and pasty.

Scrofula predisposes to, but is not necessarily associated with, *tuberculosis.*

Prophylaxis.—Prophylaxis consists in cleanliness of the mouth, regulation of the bowels, care in feeding, ventilation, sunshine.

Treatment.—Towards puberty scrofula often heals spontaneously. Before this time complete recovery is rare, though the condition may be very considerably improved, so that inflammatory and most other symptoms disappear. This may be accomplished by fresh air, including sleeping in the open, sunshine, daily baths, cleanliness, correction of a tendency to diarrhea or constipation, careful feeding.

It is well to restrict the quantity of food given if the baby is very plump. In other cases a change of diet and an addition of articles which are readily absorbed is advisable. In older children a vegetarian diet and restriction of *fat* should be instituted. Butter should be substituted for cream.

Of drugs, cod-liver oil, iron—syr. ferri iodidi (gtts. x to xxx) three times a day—and Fowler's solution of arsenic (gtts. 1 to 3) twice a day, are advisable.

For the various manifestations of the exudative diathesis atropin has given good results. One drop of atropin sulphate solution (gr. 1 to oz. i of water) is given three times a day for about three weeks.

Lymphatic Diathesis.—This condition, variously called *status lymphaticus, status thymicus, status thymicolymphaticus* and *lymphatism,* presents a complex symptomatology of which the symptoms referable to thymus gland enlargement are the most prominent.

The condition usually presents hyperplasia of the thymus gland, the tonsillar ring, the lymphatic elements of the spleen, lymph nodes, the lymphatic follicles of the digestive tract and the lymphoid marrow of the long bones.

Treatment.—Babies found to be suffering from status lymphaticus require extra care in their management. They should not be subject to operations, unless imperative, as sudden death has frequently occurred from fright, immersion into cold water, injection of antitoxin, chloroform and other anesthetics, etc.

Apart from general hygienic management nothing noteworthy in the way of specific treatment has been suggested. (*See also* Thymus Gland Enlargement.)

Cholesterin Diathesis (*Gall-stone Diathesis*).—Newer investigations make it plausible that in certain persons a surplus of cholesterin formation

(cholesterinemia) takes place in the blood with subsequent deposit of concrement in the gall-bladder.

Further investigations are necessary regarding this theory and eventually we may be in a position to suggest prophylactic measures against gallstone formation.

Spasmophil Diathesis.—This is a term used in connection with individuals, mostly children, who are prone to have tics, fits, spasms, tremors, or convulsions. The so-called *spasmophil reaction* is an opening anodal response to weak galvanic currents of one to five milliamperes. This reaction is usually not present in true epilepsy—either petit or grand mal.

The spasmophilic tendency gradually wears off and may be entirely gone at the age of puberty.

Prophylaxis and Treatment.—Hygienic living, hydrotherapy, judicious hardening and proper feeding are our reconstructive efforts. A positive Wassermann reaction would indicate antiluetic treatment.

Vagotonic Disposition or Diathesis.—Vagotonia is a form of constitutional inferiority which may disappear and reappear; it usually improves with advancing age. It may be defined as a morbidly exaggerated tonus in the autonomic nervous system, and in all probability it bears an intimate relation to anomalies of the endocrin glands.

The vagotonic disposition may be general (nervousness) or local (localized spasms).

Internal secretions have a regulating or disturbing influence on the autonomic system, the precise nature of which is at present unknown. In constitutional vagotonia we usually find a lymphatic diathesis with persistence of the thymus gland.

Symptoms.—The clinical evidence of vagotonia in children manifests itself in many ways: salivation, tendency to sweating, dermographies, laryngospasm, stomach unrest, bowel unrest, nervous diarrhea, spastic constipation, reflex anuria, polyuria, etc.

Prophylaxis.—Inasmuch as a slumbering vagotonic disposition may develop into the active state by overstrain at school, etc., hygienic plain living and avoidance of overstrain should be attempted.

Treatment.—The treatment of this condition is practically the same as for neurasthenia. For the spastic states *atropia* given internally in small doses has proven of very great value. Endocrin gland therapy for vagotonia awaits development on a practical basis.

In *vagotonia and psychasthenia combined,* suggestion therapy is salutary. (*See also* Vagotonia in Section on Nervous Ailments.)

Arthritic, Lithemic or Uric Acid Diathesis.—This is a term used to indicate a condition of an abnormal or increased amount of uric acid or urates in the blood and in which there is tendency to the formation of gouty deposits.

Treatment.—The management of this condition is practically the same as in gout and in auto-intoxication.

Rheumatic and Choreatic Diathesis.—This term is used to indicate a susceptibility to rheumatic and choreatic manifestations.

Treatment.—In children so constituted, enlarged tonsils should be reduced, adenoids removed, and regular bowel action secured. The living room should be airy and light and a judicious hardening process should be instituted at an early age.

Hemorrhagic Diatheses.—This constitutional defect must not be confused with the acquired hemorrhagic condition which develops in persons suffering from scurvy, chronic nephritis, chronic hepatitis with jaundice and cholemia and which may accompany severe acute infection and sepsis.

Hemorrhagic diathesis proper occurs in two forms: that of the *newborn,* and that known as *hemophilia.*

(*a*) Hemorrhagic Diathesis of the Newborn.—Hemorrhagic diathesis of the newborn is a congenital disease in which there is present a tendency to hemorrhage from the smaller blood vessels—from the navel, mucous membranes (especially of the mouth), stomach, the intestines, of the skin, genito-urinary tract and meninges. It occurs very early—sometimes at birth—and the diagnosis is made on the appearance of the hemorrhage. If the hemorrhage is severe and the child is restless, a rapid feeble pulse develops, with an early collapse.

The disease is said to depend on some alteration in the blood or blood vessels, but no precise information of the cause exists. Syphilis or some other bacterial infection of the mother is probably the underlying factor.

Treatment.—The indications for treatment are: stopping the hemorrhage, replacing the loss of blood, and overcoming any underlying infection or toxemia.

Direct transfusion practically meets all three indications. Crile's technic consists in connecting the radial artery of the donor with a vein of the recipient. Injections of fresh human blood serum or horse serum into the buttocks of the infant in amounts of 10 c.c. every few hours give good results. An equally simple and successful method consists in the intramuscular injection of *whole blood,* as advised by Schloss and Comiskey. Small amounts—10-30 c.c.—of blood are withdrawn from a convenient superficial vein of the mother or any other healthy adult, by means of a sterile Luer syringe, and injected as whole blood into the buttocks of the child where it is quickly absorbed into the circulation. *Direct transfusion* can also be accomplished by the *syringe-cannula method,* but direct transfusion implies a previous hemolysis test, for which there is usually no time.

When fresh human or horse serum is not obtainable a sterile dry preparation which is in the market under the name of *coagulose* may be used.

Hygienic living and the proper treatment of the intercurrent dis-

turbances during pregnancy, are the rational antenatal preventive measures to be adopted in all cases by expectant mothers.

(*b*) Hemophilia.—This is an innate condition characterized by a tendency to uncontrollable hemorrhage after slight wounds. There is often an associated arthritis.

Individuals inheriting this tendency are known as bleeders. Slight cuts, traumatic lesions, tooth extractions, etc., are followed by hemorrhages which prove more difficult to control the more often they occur. A blood examination shows among other changes a prolonged coagulation time of the blood.

Prophylaxis.—Treatment begins before birth and includes hygienic living of the mother, as emphasized in the previous remarks on Hemorrhagic Diathesis of the Newborn. The prohibition of marriage of females closely related to hemophiliacs seems to be advisable, as it is through them that the hemophilic diathesis is transmitted to males. Bleeders should protect themselves from all forms of trauma. They should consider well the dangers of surgical operations. They must be encouraged in hygienic living and should harden themselves by cold douches and cold sponge baths.

Treatment.—Immediate measures in the case of hemorrhage are *absolute rest* and *local pressure.* If the source of hemorrhage is accessible the application of fluff or plugs of gauze or pledgets of cotton soaked with *adrenalin solution* or *alum solution,* or *thromboplastin* combined with strong manual pressure directly to the wound, is advisable. Pressure with a tampon saturated with a 10 per cent solution of antipyrin will usually stop capillary hemorrhage. When the hemorrhage is especially obstinate, additional pressure should be exerted proximally over the larger tributary vessels of supply.

Cases of internal hemorrhage, e. g., from the stomach and intestines, should be treated with ice externally and with adrenalin solution or tannic acid or acetate of lead (gr. ii every 4 hours) internally.

Of late the introduction of blood serum has brought a very hopeful aspect to the treatment of hemophilia. While the serums of various animals have been used, the serum of human beings is most effective; next, that of the horse. Antidiphtheritic or antistreptococcus serum may be used in an emergency. Human serum should not be employed without a previous Wassermann test. Serum can be given intravenously (10 to 20 c.c.) or intramuscularly (30 to 40 c.c.). The benefits of the serum are apparent within a few hours and are said to continue from five weeks to indefinite duration, the coagulation time of the blood eventually becoming normal.

To prepare hemophiliacs for operation 10 c.c. of fresh animal serum are to be given as a preparatory measure once a day for several days. (*See* Section on Blood Diseases.)

Rachitis

(*Rickets*)

Etiology and Symptoms.—Rachitis is a nutritional derangement occurring principally in bottle-fed children, characterized by abnormal or deficient development of the whole organism—but chiefly of the bones and muscles—with consequent deformities, softening of epiphysis of long bones, open fontanelles and sutures, muscular weakness, nervous disturbances and anemia. The etiological factors are faulty diet and faulty digestion, to which may be added foul air, lack of sunshine and defective hygiene of city life (moldy houses).

FIG. 94.—SPONTANEOUS FRACTURE OF RACHITIC BONE.

Clinical Forms.—Rachitis shows itself chiefly in two forms:

(*a*) BONE RICKETS.—The changes consist in retardation and perversion of bone growth and are most marked in the bones of the skull, the long bones and the ribs. The cranial bones are cartilaginous and soft; the fontanelles fail to close; the long bones are soft and bend and yield to pressure and traction; the epiphyses persist and become enlarged; and after a while we find the typical rachitic rosary, chicken breast, curvature of the spine, bow legs, knock knees, flat feet, etc.

(*b*) MUSCLE RICKETS.—The muscles are soft and flabby and the children so affected walk with difficulty or lose the power to walk (pseudo paralysis).

Internal organs like the spleen, liver and thymus gland may show fibroid enlargement, and there is a tendency to catarrh of the mucous membranes.

Prophylaxis and Treatment.—It is entirely possible to prevent rickets by proper attention to diet and hygiene. Mother's milk or a wetnurse

should be provided if possible; if not, the point is not only to give food containing all nutritive elements in the right proportion, but to give it in a form that does not set up gastro-intestinal disturbances. Food adjustment is a matter of experience and cannot be laid down in a general way. For modification of milk, Section I may be consulted.

Towards the seventh month it is important to give, in addition to the milk, meat broths and gruels, and after the first year meat juice and well-cooked rice, sago or tapioca, to which the yolk of an egg may be added. But the diet should not be limited to farinaceous food; other articles, especially milk, must be given with it. The rule should be to give food rich in proteid and fat; about the same time malt extracts and orange or lemon juices may be fed in small quantities. (*See* Diet after the First Year, and formula for vegetable purée, Section I.)

Fig. 95.—Rachitic Kyphosis (Spitzy). (After Campbell-Kerr, "Surgical Diseases of Children.")

The following measures are indispensable: *outdoor life*—or at least sleeping in a well-ventilated room—frequent bathing or sponging, enemata of soap water or glycerin suppositories for constipation. Massage after the daily bath is very desirable.

Of drugs, syrup ferri iodidi—10 to 30 drops three times a day, Fowler's solution of arsenic—one drop three times a day, elix. phosphor. (U. S. P.)—five to fifteen drops three times a day, cod-liver oil in teaspoonful doses twice a day, may be recommended. All rachitic children should have abundant sunlight and plenty of cod-liver oil.

Orthopedic surgery may be resorted to for the correction of rachitic bone deformities; and the results are generally good. If *laryngismus stridulus* is present, culminating in attacks of suffocation, intubation for a few hours daily may be helpful in urgent cases.

Marasmus

(*Infantile Atrophy*)

Etiology and Symptoms.—Marasmus is a condition of rapid wasting in infants, characterized clinically by evidences of malnutrition, gastro-

intestinal unrest, metabolic disturbances and nervous irritability with loss of sleep from crying and pain. The condition is probably due to defective correlation of the digestive organs—the stomach, intestine, pancreas, and liver, with disturbance of the secretory activity of the thymus gland (*q. v.*) which is usually atrophied, or with *blocking of the abdominal lymphatics* following infectious enteritis.

Prophylaxis and Treatment.—Marasmus may be initiated by an attack of acute indigestion, and further trouble may be averted by a change

Fig. 96.

Fig. 97.

Figs. 96 and 97.—Malnutrition Marasmus Before and After Treatment. (Author's Service, Postgraduate Hospital.)

to an appropriate food. When syphilis or tuberculosis are underlying causes of malnutrition, food adjustment alone will not suffice and cannot be outlined on general principles.

Prophylactically much may be done by attention to cleanliness of the mouth, avoidance of too much and too frequent feedings, changes in the modification of the milk adopted to the advancing age of the baby, additional food articles such as meat broths and farinaceous food after the seventh or eighth months, and attention to the bowels.

Even in well-advanced cases the following measures may save the baby: change of air to the country, sea or mountain; bottle milk or artificial food should be replaced by milk of a wetnurse. If this is impossible give top milk, diluted 1 to 3 with gradual increase in strength, raw in winter and pasteurized in the summer. Asses' milk or whey and cream may also be given or, if milk does not agree with the baby, a special dietary will have to be made up. (*See* Substitute Feeding, Section I.)

Hypodermoclysis once a day (one to 2 ounces of saline solution),

gastric lavage or gavage and enemata (*see* Section I) are very useful measures for the relief of the toxemia, as evidenced by vomiting, diarrhea, and an acetone breath.

The high frequency electric current—one small plate electrode being applied over the thymus and the other in the back of the neck—may be tried. General, and particularly abdominal, massage is indicated in all cases of marasmus. The French school reports good results in marasmus cases by administering fresh sterile sea water by hypodermoclysis, 2 ounces (60,0) three times a week.

If the Wassermann test indicates an underlying syphilis an antisyphilitic treatment is indicated and blood transfusion, which has been followed by good results in some of the author's severe cases, should be resorted to. Marasmus on a tuberculous basis is usually fatal.

Ductless gland therapy for marasmus is in the experimental stage.

Blood transfusion in marasmus has been suggested.

Gout

Symptoms.—A constitutional disorder characterized by paroxysmal attacks of inflammation of joints, associated with the formation of chalklike concretions in and about the joints and in other parts of the body.

General Conditions.—The important underlying factor in gout is probably intestinal auto-intoxication brought about by faulty secretion of one or more of the glandular organs connected with the digestive tract, accompanied by the production of irritating poisonous substances which interfere with normal metabolism.

The term *lithemia* is sometimes applied to the disposition toward the formation of the gouty concretions and calculi.

Podagra, cheiragra, gonagra, and *cleidagra* are terms employed to indicate the point of local inflammation, as for pain in the metatarsophalangeal joint, the metacarpophalangeal joint of the thumb, the knee joint, and the sternoclavicular joint respectively.

When a gouty joint is dissected after death, the articular cartilages are found encrusted with a white mortarlike material, which upon analysis is found to be sodium biurate. It is found in specks, streaks, and patches, and may be confined to the articular cartilages or extended to all the structures about the joint, such as ligaments, fasciae, tendons, synovial membranes, and synovial fluid. From the enlarged joints these concretions may infiltrate overlying tissues and become subcutaneous, when they constitute the chalk stones, or tophi. These hard masses may become as large as walnuts or small oranges. They may perforate the skin and discharge a purulent material containing myriads of fine crystals of sodium biurate and develop into indolent ulcers.

The *synovial fluid* becomes thick and scanty, or there may be a small

effusion of fluid into the cavity of the joint. Later there may be erosions of articular surfaces, and thickening of the ends of the bones.

FIG. 98.—HEBERDEN'S NODES (GOUT).

The joints most frequently affected are the metatarsophalangeal joints of the great toes and most often only these; then may follow the ankles, knees, hands, and wrists. The elbows, shoulders, and hips are more rarely involved. Most rarely are the sternoclavicular, intervertebral, temporomaxillary, and laryngeal articulations.

The gouty deposits are also frequent upon the cartilage rims of the ear, tendons, various aponeuroses, the skin of the palm of the hand or soles of the feet, eyelids, nose, and other parts of the face. More rarely they occur upon the vocal cords, the cranial and spinal dura mater, the pia mater, the sclerotic coat of eye, the fibrous sheaths of nerve trunks, and the aortic valves.

FIG. 99.—ACUTE ATTACK OF GOUT IN THE JOINTS OF THE FINGERS. (After Strümpell, "Text-book of Medicine.")

A peculiar interstitial nephritis, with atrophy, is so often associated with this disease as to have received the name of "gouty kidney," or the "gouty form of Bright's disease." The peculiar feature of this nephritis is that sometimes uratic deposits are found in the kidney parenchyma. This latter condition seems more often to exist among the poor in hospital cases. In most cases renal disease is a sequence of gouty paroxysms, but in some it may precede or arise with the arthritic symptoms. In the well-to-do a

marked gouty diathesis may exist with apparently no change in the kidneys.

An *endarteritis of gouty origin* is doubtless the cause of many of the obscure circulatory and nervous symptoms of irregular gout.

Etiology.—Intrinsic Causes.—*Age.*—Most frequently middle-aged people and people advancing in years have gout. The typical attacks come oftenest between the ages of thirty-five and fifty. If there is a strong hereditary taint, it may come earlier. Young men and boys at school exceptionally have gout. Or the first attack may come in old age.

Sex.—It is rare in women, which is probably due to dietetic differences. It is said that the catamenial discharges protect women to a certain extent. After the menopause, irregular gout is not uncommon.

Heredity.—Gout runs in families. Three-fourths of the cases can be traced to a gouty ancestry. Women of gouty families may escape, but the transmission through females is more certain than through males.

Bodily Conformation and Individual Peculiarities.—A large frame and a vigorous appetite, with a tendency to corpulence, may be said to predispose to gout. Dietetic factors and a sedentary life added to these easily favor the invasion.

Extrinsic Causes.—*Errors of Eating and Drinking.*—"Gout is the Nemesis of high living." Not only by the ingestion of more food than can be oxidized, but also the presence of those conditions in the body which prevent the working up and assimilation of even a moderate supply of food are causes of gout. Highly nitrogenized articles aid in the excessive formation of uric acid in the blood.

Food of animal origin is richer in purin bodies than that from vegetables, and the prevalence of gout among people who eat meat three times a day is in direct contrast to its prevalence among meat abstainers.

Alcoholic beverages more than anything else are most provocative of gout. There is quite a difference, however, in the potency of these different alcoholic beverages.

Port, sherry, madeira, burgundy, champagne, strong ales, porter, and stout are much more powerful factors in producing gout than the distilled spirits.

Occupations, such as those of butlers, gentlemen's servants, butchers, inn keepers, brewers' drivers, and cellarmen, conduce to gout. Drunkards and topers rarely acquire gout, so that it seems as if the use of alcohol combined with highly nitrogenous foods is more conducive to gout than the one or the other alone.

Habits of Life.—Those who lead an out-of-door life and have sufficient exercise can carry on a scale of eating which would involve those of sedentary habits in the penalties of gout.

Saturnism in its relation to gout has been much discussed, and it seems that only those persons who have either an hereditary or an acquired predisposition to gout can have an attack brought about by lead poisoning.

Immediate Causes of an Attack of Gout.—They are often undiscoverable, and the attack may occur unexpectedly in the midst of apparent health.

Spring and *autumn* are the favorable times for paroxysms. At times some incident or circumstance, such as an unnatural excess of luxurious living, indulgence in rich wines, special worry, anxiety, a fit of anger, a studious effort, exposure to cold, or an accidental injury to a member or joint, may seem to be exciting causes. However, none of these could bring the attack about were not the disease latent in the system.

Symptoms.—Acute Gout.—The attack is apt to come on during the night or early morning, and there is sudden pain in one of the great toe joints, with chilliness, fever, restlessness, and sleeplessness. The next day the joint is swollen and the skin is red, tense, and shining. The joint is extremely tender and painful. The urine is scanty, high colored, and acid. Such an attack may last for a few days or for weeks.

The first attack is usually without prodromes, but the subsequent attacks and sometimes the first one are preceded by indigestion, constipation, palpitation of the heart, bronchitis, dragging muscular pains, irritability of temper, and depression of spirits. The urine is scanty and high colored or abundant and pale. There is a brick dust sediment of urates. There may be a trace of albumin, and the uric acid is below normal in amount before and during a paroxysm, but after the attack it is increased in amount.

After the inflammation has subsided, the joint returns to its natural condition or may be left a little stiff. The skin undergoes desquamation. The intensity of the inflammation of the joint varies very much in the different cases. The height of the temperature varies usually in proportion to the severity of the joint lesion, and the recovery from the first attack is usually speedy and complete, so that the patient often feels better than before the attack.

There is often an interval of one, two, or even three years before another attack, and the frequency of recurrence is greater as time goes on, until they recur once or twice a year. Then a large number of joints become involved. The attacks become subacute, and soon the condition of *chronic gout* is entered upon.

Chronic Gout.—The recovery from the paroxysms is less complete, the attacks are of longer duration, and recurrence is more frequent. Some joints may become permanently stiffened and deformed, and tophi make their appearance about the knuckles, toes, knees, and elbows. It proceeds thus only occasionally, for by a change in habits and diet the course is arrested and mitigated. Frequently as years advance one who has in middle age suffered greatly from gout may subjugate or entirely cure it. The *urine* in chronic gout is copious, of low density, and paler than normal. In about one-half of all cases there is a small amount of *albumin*. It is

usual to observe a diminution of *uric acid.* There is no diminution in the amount of *urea* excreted. Sometimes there is a tendency to the formation of uric acid *gravel,* and arthritic attacks seem to alternate with attacks of *renal colic* followed by the passing of uric acid *calculi.*

The blood serum is impregnated with urates, but a similar condition exists in leukemia, pneumonia, anemia, and Bright's disease.

Irregular, or Visceral, Gout.—One is said to have irregular gout when he has the gouty diathesis and is suffering from one or more of the associated phenomena. These phenomena are most varied in character and may implicate any function or system of the body. They may be premonitory of an attack or may come and go without any arthritic seizure; or they may occur in persons who have never had any arthritic seizures. The diagnosis is made usually by the family history and by exclusion of other causes.

Gout Affecting the Circulatory System.—Palpitation of the heart, with a faltering, interrupted pulse and syncopal threatenings, is not infrequent. A very peculiar paroxysmal disturbance of circulation is now and then witnessed in which the cardiac pulsations become extremely rapid and a condition is produced which is termed "runaway heart." Such paroxysms are very alarming. There may be a simulation of angina pectoris, and it may constitute a *"false angina,"* symptomatically indistinguishable from the true angina. Great care must be made in the differential diagnosis. There is no connection between gout and endocarditis and pericarditis except by reason of changes in the blood vessels. When the kidneys become involved, increased arterial tension will damage the circulation.

Thrombosis of Veins.—The gouty diathesis seems provocative of the formation of clots in the veins, usually in the upper or lower extremities.

The respiratory organs not infrequently feel the influence of the gouty diathesis. *Asthma, pleurisy, emphysema, bronchitis,* and *pneumonia* are among the disorders observed.

Cirrhosis of the liver has been repeatedly found.

The gouty kidney is a *chronic interstitial* nephritis with *atrophy,* which shows its regular symptoms.

Gouty Affections of the Nervous System.—Recurrent headaches, persistent depression of spirits, and various forms of neuralgia and neuritis are frequent in irregular gout. Sciatica is one of the commonest of the forms of neuritis. Facial neuralgia is exceedingly troublesome, interfering with the ingestion and mastication of food. Neuralgic pains may affect the viscera and shift irregularly from place to place. Nervous disturbances may assume a more serious form and go on to delirium.

Vertigo, cephalalgia, insomnia, nervousness, tinnitus aurium, paresthesias, muscular cramps and twitchings, and vasomotor disturbances are

among the more indefinite nervous phenomena attributed to the gouty diathesis, also epileptoid seizures and insanity.

Gouty Affections of the Skin.—Eczema is the most distinctive, and the most frequent situations are the external *ear* and neighboring parts, the *face, forehead,* and *back* of the *neck.* As a rule, it is not severe, but persistent, and confined to the parts mentioned, but occasionally it becomes grave in persons advanced in years, and spreads over a large part of the body.

Psoriasis in patches, like a dry, scaly eczema, fixed, circumscribed, and often unsymmetrical in position, sometimes appears on the legs and elsewhere.

Pruritus, local or diffused, is not uncommon, and occasionally is troublesome, particularly at night.

The *nails* may become *brittle* and ribbed, making it difficult to trim them.

Gouty Affections of the Eye.—*Conjunctivitis* and *sclerotitis* are the most common of these unusual features of irregular gout. *Gouty iritis* and glaucoma have been described. *Hemorrhagic retinitis* in connection with gout has been observed. It comes on suddenly and is always unilateral, probably being caused by thrombosis of a retinal vein.

Retrocedent Gout.—The inflammation in a joint may subside suddenly from an unknown cause or apparently the application of cold to the joint.

Differential Diagnosis.—Gout is liable to be confounded with *rheumatism, acute* and *chronic,* and *arthritis deformans,* more rarely with a gonorrheal or *pyemic joint* or *traumatic arthritis.* As a rule the diagnosis is easy, but exceptionally we find it difficult. Gouty inflammations are usually affirmed by finding uratic concretions in the rim of the ear or elsewhere. The gouty paroxysm is characteristic, and we get its history in later manifestations. The family history of gout yields important information, and of almost equal importance are the past mode of life and dietetic habits, particularly with regard to alcoholic beverages.

Age and *Sex.*—Gout seldom attacks a person before his thirtieth or thirty-fifth year unless hereditary influence is very strong. *Acute rheumatism,* on the other hand, is more frequent between the ages of fourteen and thirty. The *female* sex is very markedly more exempt from gout than from rheumatism.

Clinical Differences Between Gout and Rheumatism.—1. The *fever* of gout is not so high; the local pain is more severe; the larger joints (except the knees) are less generally implicated; there is an absence of cardiac complications; sweating is not nearly so conspicuous in gout as in rheumatism; when gout is subsiding, *edematous pitting* is usually observed about the joints, followed by a desquamation of cuticle. This is not seen in *rheumatism.*

2. In *chronic* and *irregular gout* the diagnostic difficulties are at times most embarrassing. The term *rheumatic gout* is no longer in favor, still in exceptional cases the two diseases may be combined, as a gouty person may have rheumatic fever as a separate infection.

3. From *arthritis deformans* we distinguish gout as follows:

Gout	*Arthritis deformans*
1. More common in men	Commonest in women
2. Middle-aged disease	Disease of older people
3. Well-nourished individuals	Often poorly nourished people
4. Pain is spontaneous	Pain upon motion
5. Rapid onset	Gradual onset
6. Not symmetrical	Often symmetrical
7. Temporomaxillary joint seldom attacked	This joint often affected
8. Decreased diet improves trouble	Increased diet improves
9. Tophi characteristic	None

Rheumatism may predispose to *arthritis deformans,* and the latter may be associated with gout.

A *gonorrheal joint* is associated with a history of gonorrhea.

A *pyemic joint* is accompanied by infection in some other part of the body and by a septic temperature curve.

A *traumatic arthritis* involves a history of injury.

Prognosis.—The prognosis depends upon the complications. However favorable it may be for the first attacks, permanent release from the disease is rarely to be hoped for unless the strictest hygiene and dietetic rules are followed for the rest of life. With the most careful observance of all these prophylactic and dietetic measures of treatment, future attacks will be rare or comparatively mild and may cease, and severe lesions of internal organs will not occur.

If the *kidneys* remain sound, and the periodical attacks are not too frequent and too protracted, the general level of health is not appreciably lowered.

Albumin in the urine is an untoward sign, but gouty persons may have traces of albumin in the urine for many years, even to old age.

With disease of the kidneys, the *heart* becomes affected, and sooner or later compensation fails, with consequent *edema, dyspnea, debility,* and *emaciation.* A speedy end may be brought about by *uremia, cerebral hemorrhage,* or *embolism.*

Prophylaxis.—Temperance, moderation and hygienic living, particularly in those who are the offspring of gouty parents, is the best protection. An active out-of-door life, with systematic exercise in the open air, as by

walking, riding, or driving, golf, or tennis, is essential. Heavy dinners and late hours should, as far as possible, be avoided, as well as anxious and worrying engagements and undue mental and bodily fatigue. The action of the skin must be kept in order by means of baths and friction. As gouty people are generally neurotic, idleness should not be encouraged. A glass or two of hot water before going to bed and upon rising tend to clear the body of uratic impurities.

Treatment.—*Diet.*—As has been seen, the habit of overeating and drinking, the indulgence in meats, heavy, sweet wines, and malted liquors, directly predisposes to the gouty diathesis. A moderate amount of meat once or twice a day and great temperance in alcoholic beverages must be insisted upon. An abundance of rich food must be avoided, and the watchword is plain living.

In an ATTACK of GOUT the *bowels* should be relieved at the outset by a suitable purge:

℞ Podophyllin ..... gr. $\frac{1}{3}$ 0,02
Calomel ..... gr. x 0,6
Pulv. aromatic..... ..... gr. v 0,3
M.

The skin also should be made to act. If there is high fever the patient should be put to bed upon a diet of milk, farinaceous foods, and freely administered diluents. Water and peppermint water are excellent drinks. *Alcohol* should be withheld except in old, feeble people who may have a little spirits, and whose diet must not be too meager. There should be no bleeding, no leeching; they are not necessary, and the application of cold to the joint seems not to relieve pain. The joint should be at rest, swathed with cotton and covered with an impervious protective, which acts as a poultice, promotes transpiration, and relieves pain.

For the relief of pain we employ the usual narcotics and sedatives, such as morphin subcutaneously, chloral and bromid, phenacetin, and acetanilid. Iodid of potassium and salicylate of sodium may be given in fairly large doses. Such drugs are to be taken two or three times a day in combination with 10 to 25 drops of the *wine of colchicum*. It is claimed that inflammatory symptoms in gout (swelling and pain) will subside after a few days of local treatment such as the following: A strong galvanic current is applied, with the sponge electrodes wet with fluid extract of colchicum, the current to be reversed every few minutes and applied for about one hour each day.

As soon as active inflammation subsides, the use of these drugs is to be discontinued and a regimen adopted which will diminish or overcome *intestinal toxemia*, viz.: plain mixed diet, one-third less meat; abundance of water (mineral water not essential); ten drops of dilute hydrochloric

acid, in water, after eating; a teaspoonful Carlsbad salt in the morning, in warm water; one aloin pill at bedtime; exercise, warm baths, and general massage.

The TREATMENT of CHRONIC and IRREGULAR GOUT is carried out on the same lines. It consists principally in *diet* and *regimen*. The proteids in food furnish uric acid, and although they exist in vegetables, the foods of animal origin contain a much higher percentage. *Fat, starch,* and *sugar* have no direct influence in the production of uric acid, and their free consumption lessens the amount of nitrogenous food taken and indirectly diminishes the production of uric acid.

The following table shows average percentage of albuminoid matters contained in diverse articles of food:

ANIMAL FOOD	ALBUMINOID MATTER	VEGETABLE FOOD	ALBUMINOID MATTER
Butcher's meat	19 per cent	Bread	8 per cent
Fowl	20 " "	Oatmeal	12 " "
Game	22 " "	Rice	6 " "
Fish	17 " "	Green peas	6 " "
Egg	13 " "	Potatoes	2 " "
Milk	4 " "	Carrots and turnips	1-2 " "
Cheese	30 " "	Green vegetables and salads	1-2 " "
		Fresh fruits (excluding nuts)	½-1 " "

Gouty people should partake cautiously of meat, fowl, game, and cheese, and as freely as their digestion will permit of bread, rice, garden vegetables, salads, and fruit. Diet is of such importance that the diminution of one or two grains of urates a day thrown into the circulation may make all the difference between the occurrence and non-occurrence of an arthritic attack. Finally, the Salisbury method of treatment (*see* Section I) may be mentioned, for though its employment seems to be contra-indicated on theoretical grounds it has been used with pronounced effect in numerous cases of gout.

Hydrochloric acid, Mx, t.i.d., in water after meals is highly important in overcoming intestinal putrefaction.

Certain alcoholic beverages play a very important part in the genesis of a gouty constitution. How it takes place is not known, but it is known that they produce no appreciable amount of uric acid. Distilled spirits have but little influence in producing gout, and whisky and gin less than brandy. On the other hand, the richer wines, port, sherry, madeira, champagne, burgundy, and strong ales and stout are highly provocative of gouty manifestations. Most wholesome for the gouty are clarets and the light German wines. Fully fermented and mature dry wines are less injurious than sweet and new wines. For a robust gouty individual total abstinence is best, but some persons fare better with a moderate allowance of alcoholic liquors than without any, as abstinence may favor the development of a

low, asthenic type of gout, manifestly more injurious to the general health than frank inflammatory attacks.

Mineral Springs.—Those containing sodium salts are probably provocative of harm rather than good. Among those which contain no sodium or only a trace, there are in England Buxton and Bath; in Germany Wildbad, Neuenahr, Teplitz, Ems, and the Sauerling Spring at Carlsbad, in Austria; in France Aix-les-Bains, Contrexeville, Vichy, and Barège; in the United States the waters of Saratoga, Bedford, and the White Sulphur Springs. No doubt the effect of these springs is due to their watery constituents rather than the minerals which they contain. In the quantities in which they are taken, and upon an empty stomach, they dilute the blood and help the kidneys in elimination.

In all forms of gout the study of the blood chemistry may lead to better therapeutic management.

Local Treatment of Gouty Affections.—Thickening, stiffness, and aching often persist long after an attack has passed away. Painting the joints with iodin, wet compresses, friction with stimulant liniments, shampooing with passive motion, and the application of flying blisters, all seem to help. Hot mineral baths, douches, and galvanic baths have been used with success, also vibratory massage.

Radiotherapy as administer in spas and institutions is strongly indicated in goutiness.

It is undesirable to remove the subcutaneous tophi, as the indolent ulcers remaining are very difficult to heal. If ulcers form, they are treated like ulcers of other origin, although their immersion in water for long periods, with the view of dissolving out the urates, has been most efficient.

As the affections of the skin seem oftentimes to act as a safety valve to the general system, it is desirable not to interfere too actively with them. The itching and the irritation may be so bad as to interfere with sleep, and in such cases solution of borax with glycerin, boric acid with vaselin, lead lotion, zinc ointment, and bismuth and starch powder, applied to patches of gouty psoriasis, eczema, or prurigo, often afford great relief.

Glycosuria and Diabetes Mellitus

In the present state of our knowledge it is impossible to give a clear definition of the enigma diabetes, and it is not always possible to make a good clinical distinction between an occasional glycosuria and the serious illness diabetes.

The blood contains sugar (0.1 to 0.2 per cent) derived from the liver in the form of grape sugar, levulose, and pentose. Various organs, particularly the muscles, use up sugar. A superabundance of sugar, which cannot be utilized by the muscles and organs, is carried off by the kidneys. In the healthy individual a superabundance of sugar may probably enter

the circulation through the gastro-enteric tract directly without passing through the liver, and thus give rise to what is known as *alimentary glycosuria.*

Transient glycosuria is observed following the administration of certain drugs, such as phloridzin, morphin, curare, chloroform, mercury, phlorglucin, hydrocyanic acid, and nitrite of amyl, and often poisoning by carbon dioxid. It also occurs with certain infections, such as malignant pustule, cholera, typhus or typhoid fever, scarlet fever, diphtheria, and malaria. It occurs after shock, injuries, concussion of the brain, fracture of the skull, cerebral hemorrhage, cerebrospinal meningitis, epileptic fits, anesthesia, and experimental injury to the floor of the fourth ventricle. Glycosuria may therefore be of alimentary, hepatic, pancreatic, or central origin, etc. In the diabetic patient even proteid food is found as sugar in the urine. In some diabetic individuals the urine becomes free from sugar whenever the carbohydrates in the food are below the limit of assimilation; in others the sugar disappears only when all saccharin and amylaceous food is stopped. These are the milder forms of diabetes.

In the severe forms a strict meat and fat diet will not eliminate the sugar, which is probably formed from albumin. In some cases of severity, adiposity and goutiness are associated. It has been shown experimentally that extirpation of the pancreas in animals results in severe glycosuria, and some of our older pathologists report pancreatic disease in diabetes. On the other hand, numerous autopsies have shown a normal pancreas in diabetic subjects. The liver appears to play an important rôle in the pathology of diabetes. The excessive formation of organic acids and their acid products, acetone and β-oxybutyric acid, as found in the urine, appear to have some influence in the production of diabetic coma.

In all probability chronic glycosuria or diabetes is a complex disease of faulty internal secretion involving one or more of the ductless glands (including the glandular apparatus of the intestine), and the exciting causes may be traumatism, infection, or intoxication with subsequent organic changes in one or more of the affected organs.

Etiology.—Predisposing Causes.—

1. *Heredity.*—Cases are on record in which many members of the same family have been afflicted with the disease. Some diabetics have had family histories of *gout, insanity,* and *phthisis.* Hebrews are more commonly affected with diabetes than others of the community in which they dwell.

2. *Sex.*—Men are oftener affected than women, the proportion being about three to two.

3. *Age.*—The fifth decade seems to be that in which we see the largest number of cases, although children and extremely old people may rarely be affected.

4. *Temperament.*—People of a neurotic tendency seem more likely to have the disease, the people of the older families and the more highly civ-

ilized. Thus, the older people of the older countries, as of India, Ceylon, and Italy, seem more prone to the disease than those of the more newly civilized countries. Thus the Hebrews, representing a highly intellectual class, a race given to a sedentary existence and often to high living, are more likely to have this disease than any other race.

5. *Obesity* has been mentioned as a cause, but its relation to diabetes is obscure.

6. *Gout, syphilis,* and *malaria* have been considered predisposing factors. The fact that a number of instances are on record where man and wife have had the disease one after the other makes us think of a contagious element (*diabète à deux*).

Exciting Causes.—*Mental Shock.*—Severe nervous strain and worry, emotional disturbances, excessive sexual indulgence, and the climacteric precede many cases.

Injury to or disease of the cord or brain, particularly of the medulla, such as *hemorrhage, new growths, sclerosis, tabes dorsalis, epilepsy, insanity,* and *Graves's disease,* have also seemed to be exciting factors.

Bodily injuries, such as *railroad accidents,* probably through a derangement of the innervation of the liver, are also reputed causes.

It follows *infectious fevers,* such as *typhus, typhoid, diphtheria, influenza, acute rheumatism, malaria, scarlatina,* and *cholera.*

Pregnancy has apparently given origin to some cases.

Occasional cases have followed *abscess* of the liver, malignant disease in the *abdomen* not involving the pancreas, *exposure* to cold, *iced food* and *drinks,* and *disease* of the *pancreas.*

Symptoms—Complications—Diagnosis.—The symptoms begin insidiously, and the first things usually to attract attention are the unnatural thirst, the frequent voiding of large quantities of urine, and a voracious appetite.

1. External Appearance.—We see usually wasting and emaciation, but well-developed and even adipose diabetics are seen. The skin is harsh, and may show carbuncles or boils, or scars from them. It may be pigmented (*bronzed diabetes*). The hair is scanty and dry.

2. The Urine.—The urine is usually pale, of a sweetish odor and taste, with a specific gravity usually from 1.025 to 1.045, exceptionally being lower or higher, and measuring in quantity from 6 to 8 pints in mild cases, to 30 to 40 pints in severe cases, in twenty-four hours. The specific gravity has been as low as 1.002. The reaction is acid. Sugar is present in various amounts, from one-half per cent up to 10 per cent in severe cases. One to two pounds may be excreted in twenty-four hours. In exceptional cases there is no polyuria. To establish the diagnosis of diabetes, the elimination of grape sugar must be constant and extend over a long period.

Glycogen is said to be found in diabetic urine. *Albumin* is present

frequently. *Gas* may form in the bladder as the result of fermentation. *Fat* in the urine (lipuria) may exist. *Urea* and *phosphates* may be increased in amount, and *acetone* may be present. *Polyuria* is usually very marked.

3. Symptoms Referable to the Digestive Organs.—*Hunger* and *thirst* may be excessive. *Digestion* is usually good, although constipation is common and temporary diarrhea occasional.

The *tongue* is usually dry, broad, and thick, with an irregular and fissured surface. It is sometimes coated and sometimes red. The gums may become spongy and bleed easily. The teeth tend to decay rapidly. *Thrush* may appear on the soft palate. *Jaundice* is frequently present.

4. Constitutional Symptoms.—In the milder cases the general health remains unaffected for a long time. The body remains well nourished, and there is little discomfort except from the polyuria and polydipsia. In the severer cases the general health soon begins to show the drain. *Emaciation, weakness,* and *exhaustion* upon slight exertion are observed, and ultimately the *marasmus* may be extreme. The intellectual capacity is not impaired, although there is an *indisposition to mental effort. Depression* and *irritability* are usual. The temperature is normal or subnormal. If there is fever, it is due to some complication.

The **complications** of diabetes are exceedingly numerous.

Cutaneous Complications.—*Furuncles, carbuncles,* and suppurative processes following abrasions, injuries, or operations are frequent. *Purpura* is often present, and *gangrene,* especially of the feet, is apt to occur. The nails are dry and may atrophy or fall out. *Herpes zoster* and *perforating ulcer* are occasionally seen accompanying the disease. *Profuse sweats* may occur.

Genito-urinary Symptoms.—It is seldom that nephritis develops except late in the disease, and then come its symptoms. *Albuminuria* and *edema* are not infrequent. Sometimes the first symptoms are irritation and *pruritus* of the parts where moisture from the urine is likely to exist. In men there may be *balanitis,* inflammatory *phimosis,* or *paraphimosis. Impotence* may be an early symptom. Cystitis is seen from time to time.

Pulmonary Complications.—A fruity odor to the breath is the rule. Later in the disease pulmonary complications are very common, and nearly one-half of the patients die of *pneumonia, tuberculosis* of the lungs, or *gangrene* of the lung.

Circulatory Symptoms.—The pulse and the heart are seldom affected until the disease is well advanced, when *endarteritis* and *hypertrophy* of the heart may develop. *Dilatation* of the heart may cause a fatal termination, as may also a fatty heart. The nervous symptoms are very important.

Diabetic coma is one of the most interesting and dreaded symptoms of this disease. It is more likely to occur in the young patients and in those in whom the disease advances rapidly and is associated with rapid

emaciation. Before the onset of the coma the urine contains as much sugar as previously, although the amount of urine may be diminished in quantity. Three forms are described:

1. After an unusual bodily or mental exertion, the patient suddenly becomes prostrated, the heart's action grows rapid and feeble, the skin is cold, stupidity and a comatose condition supervene, and death occurs in a few hours.

2. For a few days (from six to nine) the patient complains of weakness and gastric disturbances, nausea, loss of appetite, constipation, pain in the abdomen, drowsiness, and breathlessness. Some local affection, such as pharyngitis, a phlegmon, or a pulmonary complication, is present. Headache, restlessness, delirium, rapid and labored breathing, cyanosis, a feeble and rapid action of the heart develop, then stupor and coma come on, death occurring in from one to five days.

3. Without previous dyspnea or prostration, headache may develop suddenly, then vertigo, stupor, and coma, and death occurs in a few hours.

Much discussion, theorizing, and painstaking investigation have been in progress for years as to the cause of this coma, but it now seems to be the almost universal opinion that it is due to acid intoxication and that the acid is β-oxybutyric acid, which accumulates in the tissues, circulates in the blood in enormous quantities, and is eliminated in combination with other elements. Temporary improvement and even cessation of the symptoms of impending coma are not impossible, but they are very exceptional.

Peripheral Neuritis.—There may be mild neuritis in different parts of the body, giving rise to neuralgic pains, numbness, and tingling. *Sciatic* pains may be severe.

Diabetic tabes is a name given to the association of severe neuritis with lightning pains in the legs, loss of tendon reflexes, paresis of the extensors of the feet, and the characteristic gait, which is called "steppage."

Diabetic paraplegia is probably also due to neuritis. Cases are seen where both arms and legs have been paralyzed.

Mental Symptoms.—Restlessness, headache, dizziness, anxiety, nervousness, and a tendency to melancholia are seen. Occasionally general paralysis develops.

Special Senses.—Cataract, particularly in the younger patients, is common.

Retinitis, hemorrhage into the retina, optic atrophy, sudden blindness, and paralysis of the ocular muscles have been observed. Otitis media at times seems to be diabetic in origin.

Sexual Functions.—Impotence may be a common and early symptom.

Abortion is likely to occur, if conception (which is rare) takes place. A diabetic mother may have a healthy child. Pregnancy and delivery aggravate the disease.

Laryngitis and furunculosis of the larynx have been noted.

Course and Prognosis.—Diabetes presents itself in two forms: (*a*) The *acute form,* occurring chiefly in the young, usually leads to a fatal termination within a year or two; (*b*) the *chronic form* is frequently associated with obesity or gout and albuminuria. Sufferers from the chronic form may live fairly comfortably for years, but a permanent cure is hardly to be expected.

As a rule the older the patient at the beginning of the disease, the more chronic is the course. The disease is more favorable when the patient has no hereditary dyscrasia, when the disease is concurrent with obesity and gout, when it begins late in life, when the social conditions are favorable and there is freedom from business and financial worry, and when treatment is begun early. The prognosis also depends upon the degree to which treatment is successful in reducing the amount of sugar. In cases supervening after an accident or acute disease the patients sometimes get well rapidly and sometimes slowly. In cases occurring at the climacteric in women the patients are more likely to recover than in any of the other cases. The state of the circulation, indicated by arterial pressure and cardiac impulse, is of great importance in the diagnosis. Complete recovery cannot be expected, but a large number of patients may enjoy fairly good health for a number of years. If it occurs in a person under forty years old, the outlook is bad. Death occurs from heart failure, diabetic coma, pulmonary affections, or nephritis. A few die exhausted and emaciated from the disease alone. The terminal stage of diabetes is that of ethyldiacetic acid poisoning.

Prophylaxis.—Apart from hygienic living we have, up to the present time, found no prophylactic measures against diabetes.

The increasing number of cases of *diabète à deux* reported in medical literature would indicate that it is not desirable that a diabetic and a non-diabetic person should share the same bed.

Principles of Management

1. Secure hygienic living and eliminate worry and care if possible.
2. Strengthen the system and if possible increase its power of resistance to infection.
3. Support the organism and replace its losses.
4. Ascertain the point of tolerance for carbohydrates.
5. Raise the point of tolerance if possible.
6. Minimize hyperglycemia.
7. Combat dangerous acidosis.
8. Prevent and treat complications.

How to Determine the Tolerance for Carbohydrates

1. Give the patient for several days a known quantity of carbohydrates.

2. Determine the amount of sugar excreted in the twenty-four-hour urine.

3. Ascertain the amount of sugar in the blood.

4. Ascertain the difference in caloric values of ingested carbohydrates and excreted sugar.

5. Ascertain the tolerance for different varieties of carbohydrates, and also for proteins and fats.

Principles of Diet Regulation

1. Arrange a diet which provides for thirty-five calories per kilogram body weight daily and replaces the caloric energy lost from sugar expended by the diabetic.

2. When carbohydrates must be excluded from the diet the patient should have about four ounces of proteins and enough easily digestible fats and alcohol to make up the caloric balance.

3. In beginning acidosis von Noorden's oatmeal diet containing butter and eggs, with or without vegetable albumin (tropon, glidin, roborant) should be interpolated for a day or two.

4. After the point of tolerance for carbohydrates is known their further addition to the diet must proceed very slowly.

5. Diet regulation and general hygienic measures are the only known means of counteracting the patient's hyperglycemia.

General Management

The patient should understand fully that much may be accomplished by reducing the cares of business, by devotion to a fairly active outdoor life, removal to a climate presenting few radical changes, by general hygiene, such as daily baths—hot, lukewarm, or cold if easily borne, or spongebaths, by gentle sports short of fatigue, general body massage, vibratory treatment over the entire abdomen (*see* Section I), the static current or the high frequency current (with one large electrode applied over the abdomen and another over the back and employing about 1,500 to 2,000 milliampères), by sleeping in the open and living in cheerful surroundings. If the patient's condition permits of traveling, a sojourn at Neuenahr, Vichy, Carlsbad or Marienbad may be suggested; if not, a mineral water treatment at home, using Vichy—the bicarbonate of soda content of which replenishes the diminished alkalinity of the system—may be helpful.

Dietary Treatment

Non-Carbohydrate Diet.—A dietary treatment in simple form may be begun by ascertaining how the urine may be freed from sugar by a strictly non-carbohydrate diet, such as suggested by von Noorden.

Breakfast at 7.30 a. m.: Beefsteak; mutton chops—without bone, or boiled ham; one or two eggs; coffee or tea without milk or sugar.

Luncheon at 12.30: Cold roast beef (℥vi); celery, fresh cucumbers or tomatoes (℥ii); whisky (℥v), with water (℥viii); coffee without sugar or milk.

Dinner at 6 p. m.: Clear bouillon (℥vi); roast beef (℥viii); butter (℥ii); green salad (℥ii), with vinegar (℥ii), and olive oil (℥v), or three tablespoonfuls of some well-cooked green vegetable; three sardines in oil; whisky (℥v), with water (℥viii).

Supper at 9 p. m.: Two eggs—raw or cooked; water (℥viii).

Many cases respond very quickly, so that in a few days the test for sugar will be negative.

If with the above diet the patient passes no sugar, just enough starch or sugar may be added in the diet to make the sugar reappear in the urine, and then keep just below that amount. Every few months the patient may be returned to the strict diet for a short time.

The diet may include: bouillon and clear soups, ox-tail, turtle soups; coffee, tea, cocoa, chocolate, lemonade, these without sugar, but saccharin is permissible for sweetening; soda water, Vichy, Apollinaris, Saratoga water with a small quantity of milk.

Animal food: fish, foul, game and meats of all kinds (except liver), eggs, cream, butter, buttermilk, curds and cream cheese.

Bread: small quantity of gluten and brown bread, almond and cocoanut biscuits.

Vegetables: lettuce, celery, endives, spinach, tomatoes, chicory, sorrel, radishes, asparagus, water cress, cucumbers.

Fruits: apples, pears, plums, lemons, oranges, currants, cherries, melons, raspberries, strawberries, nuts—all in moderation.

Articles to be forbidden are: thick soup; liver; bread—except in small quantities; all farinaceous preparations such as rice, hominy, tapioca, arrowroot; sage, potatoes, parsnips, turnips, squash, corn, lentils, beans, peas, beets; beer, sweet and sparkling wines and drinks.

It is a good plan when patients take a liberal admixture of starchy food to abstain from all carbohydrates one day each week.

Recipe for Almond Cakes.—It should be remembered that preparations claimed to be free from carbohydrates, such as gluten, are frequently adulterated; hence the following recipe for making almond cakes may be of value. Beat up four eggs and add two tablespoonfuls of milk, salt or saccharin to taste and one pound of almond flour. Divide into cakes and bake for forty-five minutes in a moderately hot oven.

A strict diet for some days is also advisable in order that the tissues may regain some of their power of consuming sugar; if the sugar in the urine remains fairly high, a strict diet should be continued for several weeks or until the patient begins to show acetone or diacetic acid; then

milk—up to a pint daily, potatoes and such vegetables as cauliflower, spinach, asparagus, lettuce and fruits, as well as toast and a moderate amount of gluten or crust of bread may be allowed. Fruit does not increase the amount of sugar in the urine to any large extent because its sugar is mainly levulose.

An almost endless literature has sprung up around the dietary treatment of diabetes, much of which is of questionable value. Von Noorden's Oatmeal Diet has been widely recommended, chiefly perhaps because of the prominence of the author. It is certain that it should be used only in the more severe cases, especially where there is marked acidosis with threatening coma. Some cases may grow worse and in others it fails altogether.

Von Noorden's Oatmeal Diet.—The diet consists of oatmeal (℥viii), thoroughly cooked with water for two hours; to this is added butter (℥iv) and six to eight eggs or the whites of eggs; and salt to taste. This is given in three to eight portions. Nothing else is allowed except black coffee, tea, lemon juice, a little old wine, brandy or whisky.

Three or four days of this diet are to be followed by one or two vegetable days. This course of treatment may have to be repeated several times. The return to the ordinary diet should be very gradual.

Meinhert's Diet.—Worth while mentioning is Meinhert's method. He employs a restricted carbohydrate diet, seeking to remove any acid condition of the bowel and endeavors to bring about a complete metabolism of the proteids and fats in the alkalized intestine in the following manner. He administers daily up to 40 or 50 keratin-coated pills of sodium hydrocarbonate (0,5 each), the number depending upon the reaction of stool and urine; and 6 to 8 keratin-coated pills of papain (0,5 each) an hour before meals, to support proteid digestion, and in some cases for the fat digestion, a keratin-coated pill of steapsin (0,3) an hour before meals. The results are claimed to be excellent.

Guelpa's Fasting Method.—Mention may be made also of Guelpa's fasting method. He aims at relieving the system of its encumbering effete and toxic material and treats diabetes with apparent success on the theory of its being the result of auto-intoxication. He combines periods of abstinence from food with purgation. On one, two or three days he permits the patient to take a bottle of Hunyadi János water warmed, or one and one-quarter to one and three-quarter ounces of castor-oil followed by one and one-half pints of water, or a large dose of salines very much diluted. Water or weak tea is freely permitted at all times, but the patient is starved for a day or two, and is then allowed a diet of one pound each of meat, potatoes and green vegetables.

Metchnikoff's treatment, described under "Auto-intoxication," is being recommended at present by the makers of the "Lactobacilline Liquids." They prepare a special culture, "D", for use in diabetes.

The Allen Method for Treating Diabetes by Fasting.—This method is reported [1] as follows:

The first step is to fast—preferably in bed—until glycosuria ceases, and then for from twenty-four to forty-eight hours longer. Acidosis, if present, is thus rapidly reduced. Alcohol may be given during the fast, in the form of whisky or brandy. When the fasting patient has been free from glycosuria from twenty-four to forty-eight hours, the next step is to begin feeding very slowly and cautiously. A fixed program is unnecessary. It is desirable to establish the diet to suit the needs of the individual patient. The one requirement is that the patient must remain free from both glycosuria and acidosis. Any trace of sugar is the signal for a fast day. The original fast, to clear up the urine, may be anywhere from two to ten days in length, but after that no fast need be longer than one day. The factors to be considered in the diet are protein, carbohydrate, fat and bulk. Frequently the first thing given after the fast is carbohydrate. No distinction is necessary between different forms of starch, but there are advantages in using vegetables. The first day after fasting, the only food may be 200 gm. of vegetables of the class containing 5 and 6 per cent of carbohydrates. This is increased day by day until a trace of glycosuria appears, which is checked by the fast day. The purpose of such a program is to learn the carbohydrate tolerance and to clear up the least trace of acidosis.

After the carbohydrate period, according to Allen, or sometimes in place of it, protein may be given. On the first day perhaps one or two eggs are given and nothing else. More protein, such as eggs and meat, is added day by day until the patient either shows glycosuria or reaches a safe protein ration. The purpose is to learn the protein tolerance and to regain protein lost as quickly as possible. Fat is somewhat less urgently needed except in weak and emaciated patients. It can be added gradually as conditions seem to indicate. An element of bulk in the diet is necessary to give a comfortable feeling of fullness and to prevent constipation. For this purpose, green vegetables are advantageous. When they are fed raw, cooked in steam, or boiled and evaporated, so that no water is thrown away, it is possible to estimate the quantity of carbohydrate, and the valuable salts remain. If the case is so severe that even green vegetables cannot be tolerated, the vegetables may be boiled through three waters, throwing away all the water. Nearly all starch is thus removed, and the most severe cases may take these thrice-cooked vegetables.

One result of the initial program described is loss of weight. The attempt to put on too much weight, according to Allen, is one of the sure ways of bringing back all symptoms, and is probably one of the chief causes of past failure in treating severe cases.

In brief, it is necessary to restrict all classes of food, and to test the tolerance of each patient in each particular class. Carbohydrate is given if possible, but is kept safely below the limit of tolerance.

Specimen Diet for One Week

Supper.—One-half dozen raw oysters, two lamb chops, lettuce, gluten bread and butter, cheese, and a cup of tea.

Breakfast.—Two soft boiled eggs, gluten bread and butter, and a cup of coffee with cream.

[1] *Jour. Amer. Med. Assn.*, June 12, 1915.

Dinner.—Bouillon and egg, a piece of steak, oyster plant, salad, gluten bread and butter, and claret wine.

One-half hour later.—A cup of coffee.

Supper.—Cold turkey, sardines, celery, a piece of cheese cake made with gluten flour and levulose, and a cup of tea.

Breakfast.—Two soft boiled eggs, gluten bread and butter, and a cup of coffee with cream.

Dinner.—Bouillon and egg, roast turkey, gluten bread dressing, celery, cranberries sweetened with levulose, Moselle wine, and a cup of coffee.

Supper.—Turkey salad, celery, cheese, and a cup of tea.

Breakfast.—Two soft boiled eggs, sardines with lemon juice, and a cup of coffee with cream.

Dinner.—Bouillon and egg, a piece of steak, gluten bread and butter, cheese, claret, and a cup of coffee.

Supper.—One-half dozen raw oysters, milk oyster stew, and tea.

Lunch at 10.30 a. m.—Sauerkraut and pigs' knuckles, wine and seltzer.

Breakfast.—One glass of milk and seltzer, two soft boiled eggs, and a cup of coffee with cream.

Dinner.—Bouillon and egg, corned beef and cabbage, claret wine, a cup of coffee, and gluten bread and butter.

Supper.—One boiled fish with butter sauce and celery, gluten bread and butter, and a cup of tea.

Breakfast.—Ham and scrambled eggs and a cup of coffee with cream.

Dinner.—Chicken fricassee, celery, spinach, bouillon and egg, a cup of coffee, and bread and cheese.

Supper.—Smoked salmon, cervelat sausage, gluten bread and cheese, and a cup of tea.

Breakfast.—Two soft boiled eggs and ham and coffee with cream.

Dinner.—Bouillon and egg, beefsteak and salad, gluten bread and wine.

Four p. m.—One dozen raw oysters.

Supper.—Steak, celery, bread and butter, cheese, and a cup of tea.

In order to avoid monotony, variety in soups, vegetables, flavoring and seasoning substances should be planned.

Medicinal Treatment

Medicinal treatment is of little use. Of the drugs used, *opium* is held in some regard on account of a limited power of arresting the excretion of sugar. One grain of extract of opium, preferably disguised, and alone or with belladonna may be given at bedtime. Some prefer *codein*—one-half grain. *Blueberry leaves* in decoction or powder form is an old household remedy, so is *brewer's yeast* in tablespoonful doses, three times a day. *Tryptogen* may be tried in tablets (gr. v) three times a day. Culbol, which contains the Bulgarian bacillus, may be tried.

By way of symptomatic treatment the following are suggested: pot. bromid to soothe the nervous system; sciatic and other pain may call for the administration of morphin per hypo, or phenacetin or antipirin (grs. xv) may be tried instead. In facial neuralgia, butylchlorate (gr. xv doses) or a liniment of menthol and chloral—equal parts—may be tried. Hydrochloric acid in five drop doses given after each meal will aid digestion.

The *thirst* may be stilled by sucking chopped ice or a piece of lemon or drinking hot water; pilocarpin, hypodermically, will relieve the dryness of the mouth.

The *intolerable itching,* especially about the genitals, can be overcome by the most scrupulous cleanliness. The affected parts should be wiped with a cotton ball moistened with a saturated borax solution. Sore parts may be dusted after cleansing with talcum powder or protected with a greasy zinc or boric ointment, or carbolic acid ointment (3 per cent).

As soon as there are signs of impending *coma* the bowels should be emptied and bicarbonate of soda may be taken internally (℥i a day), or an intravenous injection (gms. 8,5 to 500 c.c. of water at a temperature of 100° F.) may be given (*see* Section 1) and repeated after 48 hours if necessary. Hypodermoclysis of this solution must *not* be attempted as it is irritating and apt to produce sloughing.

An enema of ℥i to ℥ii of bicarbonate of soda to one pint of water, by enteroclysis or the Murphy drip may be helpful. Little else is of use. All other complications mentioned in the forepart of this article should receive prompt attention. Radium treatment probably has some curative value in chronic diabetes, but nothing definite as regards indications can be laid down at the present time.

If in a given case of diabetes the sugar tolerance has been ascertained, the hygienic and dietetic reforms established and if the patient feels well and comfortable, as many do, a strict medicinal supervision does more harm than good to the patient by accentuating his anxiety and apprehension. Far better it is to discharge the diabetic temporarily, with his promise to report two or three times a year as long as he feels comfortable.

Mechanotherapy in Diabetes

All forms of exercise are beneficial in moderation. Vibratory massage over the stomach, liver, pancreas, or the entire abdomen and lumbar region should be employed.

Electrotherapy in Diabetes

The high frequency current or the static current should be tried.

Leanness

How to Increase Weight.—The failure to take on a normal degree of flesh and weight sometimes runs in the family, but more often is due to

some slight constitutional disturbance, to poor or insufficient food, hasty eating, deficient internal secretions, lack of proper exercise or to overwork and poor hygiene.

In trying to overcome leanness, the cause should be searched for and if ascertained be corrected.

The following measures will go far to remedy abnormal leanness:

A *diet* of 3,000 calories made up of nutritious food, such as meat, sugars and carbohydrates, cream, milk, butter, cheese, eggs, puddings, toast, bread, is to be adjusted. Instead of only two or three meals a day, four, five or six may be taken at regular intervals, but the stomach must not be allowed to become overloaded. If the appetite is poor it may be stimulated by some simple bitter or nux vomica and hydrochloric acid, and care should be taken to chew all food well.

Violent exercise such as tennis or horseback riding should not be indulged in. On the contrary, it is well to advise plenty of *rest and sleep* combined with massage or passive motion (*See* Rest Cure at Home, Section I).

Of *drugs,* cod-liver oil, malt extract, iron, arsenic and strychnin will help in toning up the system, and in cases not responding to this management a polyvalent ductless gland preparation may be tried—polyglandular extract one ampule a day per hypo or per mouth, each ampule containing one cubic centimeter.

Obesity

"The development of fat constitutes a disease when it interferes with the function of some organ or organs."

Etiology.—1. *Heredity.*—In some families there are generations of fat people. These persons seem to grow more and more obese as they grow older, and the treatment is very unsatisfactory unless rigidly carried out. We must not, however, overestimate the hereditary tendency.

2. *Modes of Life.*—Bad habits of life are probably the most important of all the causes. The habit of overeating, particularly of carbohydrates and fats combined with alcoholic beverages, especially beer, is most pernicious. With this overeating, a lack of exercise, as is usual in a sedentary life, and oversleep prevent oxidation, and fat accumulates.

3. *The sexual relations* seem to offer a predisposition to fat accumulation. At puberty, at the menopause, and after atrophy or removal of the testes or ovaries we see individuals grow stout.

4. *Congenitally small lungs,* making a defective oxygenating capacity, have also been mentioned as a cause. As people get adipose they are inclined to be less active and to take less exercise on account of the difficulty in getting about, and the fat accumulates more rapidly.

Pathology.—We should distinguish between fatty degeneration and fatty infiltration, which is the condition we find in obesity. In fatty infil-

tration, which is not necessarily a pathological condition, there is simply an excessive deposit of fat in the cells where normally fat is found. As this accumulates we observe the puffy cheeks, the pendulous breasts and abdomen, the massive buttocks and thighs, and the coarse, greasy epithelium which are so unpleasant to see. Within the thorax and abdomen, about the heart and kidneys, and in the omentum this increase in fat may be enormous. Fatty degeneration is a term used to indicate the process of decay, a fatty breaking down of the albuminates within the tissue elements themselves.

Symptoms.—There seem to be two forms of obesity, plethoric and anemic. Plethoric obesity is more common in men, and seems the result of a general overnutrition. After the general infiltration of all parts of the body with fat, we ultimately observe hypertrophy of the heart and arteriosclerosis. Then occur the derangements of circulation in different parts of the body, dropsy, cardiac asthma, cerebral hyperemia, vertigo, tinnitus aurium, and throbbing of the arteries. A sudden increase of arterial pressure may cause rupture of a cerebral or meningeal vessel.

Anemic Obesity.—In this form we observe the symptoms of anemia and those of obesity. It is more common in women and children, and the blood is always impoverished. Obesity may be extreme, and we note the fatty masses and the flabby, feeble, and ill-developed muscles. The heart muscles also become flabby, and there is a small, feeble pulse from its diminished activity. There is a great incapacity for exertion, palpitation of the heart and dyspnea resulting from the slightest exercise. These patients are more seriously ill than those who are obese from plethora. They are not gross feeders, nor always are they large drinkers. They usually prefer carbohydrate food, often having an aversion to animal food. This adiposity may be established before full growth, after menorrhagia, after severe hemorrhage from childbirth, and after severe exhausting illness or full mercurial courses. Dropsy is commonly associated with this form.

Obese people are ill adapted to withstand any acute diseases, especially fevers. There is a progressive failure, unless a rigid and yet not too exhausting treatment is intelligently pursued. There ensue heart failure, bronchial catarrh, emphysema, gastro-enteric catarrh, gastro-ectasia, fatty liver, greasy skin, comedones, greasy warts, eczema, erythema, and intertrigo, furunculosis, and with a use of alcohol to excess we observe rosacea and hypertrophy of the nose.

The causes of death may be cerebral apoplexy, cardiac failure, angina pectoris, or uremia.

Prophylaxis.—Those who from any cause whatsoever incline towards obesity should begin to restrict the quantity and quality of their food, cutting down on fat-forming articles, such as cream, sugar, starches and alcohol. One or two bowel movements a day must be secured; these per-

sons should live and sleep, if possible, in the open and take plenty of exercise, such as walking, climbing, tennis playing, horseback riding and swimming. Restriction of water drinking, including soups, milk and beverages of all kinds is essential. Sea bathing is a rational preventive.

Treatment.—The aim of all treatment is to prevent the ingestion of new supplies of fat and to promote oxidation. Some people do not get fat by forced feeding, and others do not get lean by underfeeding. There must be some factor influencing metabolism outside of lack of harmony between the quantity of food and spent energy. Perhaps the factor is suboxidation.

Diet.—We may get remarkable results by regulating the diet. In general we withdraw a large part of the fat-producing articles. If we take away all of the fat and fat-producing food, the system suffers in various ways, so we allow small amounts. Fluids in large amounts should not be allowed, and the patient should be told to drink but very little at meals, reserving the time two hours after eating for the fluids. The "cures" established at Carlsbad, Marienbad, Kissingen, etc., depend, not alone upon the mineral water, but upon the diet and modes of life. The life of patients at such places can be much better arranged than it could be in their homes and during the management of their business affairs.

In treating cases we first weigh the patient, then make a careful physical examination, noting the condition of the muscular walls of the heart, the state of the arteries, and the urine. Hereditary tendencies, habits, the plethora or anemia, and the gouty or hemorrhagic proclivity must be considered. The presence of glucose in the urine and the output of urea, in addition to the foregoing, teach us in how radical treatment we may indulge.

The various systems of diet based upon the caloric demand for maintaining metabolic equilibrium are discussed in Section I and in the article on the Fat Laden Heart in Obesity, to which the reader is referred.

Many dietaries have been written and used in different cases, but the observant physician must make out a diet to suit his patient. The following is a specimen: Six to eight ounces of hot or cold water half an hour before breakfast.

Breakfast.—One to two ounces of toasted stale bread without butter, broiled white fish, mutton chop, beefsteak or cold chicken, game, beef tongue or lean ham. One or two small cups of tea or coffee with a little skimmed milk and no sugar. Saccharin may be used for sweetening.

For weakly patients we may allow six ounces of bouillon or clear soup with a gluten or almond biscuit between breakfast and luncheon.

Luncheon.— Cold meat, poached egg with spinach, lettuce, water cress, or other green vegetables, or a small omelette. A small amount of crust of bread or hard biscuit and a small amount of butter may be allowed. A glass of Bordeaux or Moselle wine (dry) may be taken with as much water.

In the afternoon we may allow a cup of tea or a little skimmed milk and a gluten biscuit.

Dinner.—No soup as a rule, although occasionally a little thin consommé may be allowed. A little broiled or boiled fish, without starchy or fatty sauces, oysters or caviare, broiled or roasted meat, mutton, game, fowl with a very small portion of fat, green vegetables, no potatoes, and some stewed fruit flavored with saccharin or rendered less tart by adding half a teaspoonful of Rochelle salt. Two glasses of claret or a dry Moselle diluted with water may be allowed. Before going to bed, a cup of hot weak tea without milk, or as much hot water, should be taken.

The drinking of a glass of Kissingen water one hour after meals, and Vichy at the same time on alternate days, has, in addition to diet, been very beneficial in reducing fat.

Fig. 100.—Running Exercises (Jack Cooper Training Machine).

Exercise.—Regular exercise must be insisted upon—walking, riding, bicycle riding, or moderate gymnasium work. The amount is to be regulated by the effect upon the heart. Oertel's system of exercise consists in climbing elevations, such as hills and mountains.

Gland Therapy.—*Thyroid extract* has been found to be highly beneficial in some cases, probably by assisting oxidation, but it is not yet known in which class of cases it can be used with impunity. The effects must be watched as carefully as in myxedema. The dose should be small to begin with—one grain—and if no bad effects are noted, it can be increased to five or seven grains three times a day.

Pineal gland preparations have been given in obesity.

Electric Muscular Contractions.—Chatillon has given the Bergonié electric apparatus a thorough trial in the treatment of obesity in twenty-two cases. The results were more satisfactory when the diet was regulated at the same time, but, even alone, a number of the patients lost from 4,000 to 6,000 gm. On a slightly reduced diet one lost 8,900 gm. No effect was apparent in one case after fifteen hours' application of the apparatus and great reduction of the diet. Another patient lost 409 gm.

per hour of application plus dieting; nothing else had had any effect in this case.

Diet Systems in Obesity

Without doubt the Banting and Salisbury methods of treatment (*see* Section I) have produced many brilliant results in reducing fat and weight. As the main factor in the production of obesity is sugar and starch, and to a lesser extent fat in the food, a withdrawal of such articles would seem reasonable. Much stress is laid on the importance of drinking large quantities of water.

Ebstein's treatment is similar to those mentioned above, but fat and a small quantity of sugar and starches are permitted. *Oertel* recommends the same except that he insists on exercise and on *restricting fluids* and fats. *Weir Mitchell* recommends a diet of milk and eggs exclusively, allowing one-half pint of milk and an egg five or six times a day for several weeks. The general principle of restricting the intake of carbohydrates, sugars and fats in favor of proteid food is well established.

As mentioned above, there is a difference of opinion as to fluids. Some advise restricting the quantity of fluids to about one quart daily, especially in the anemic form, and not when glycosuria is present; others insist that, especially when the diet is predominantly nitrogenous, it is advisable for the removal of the products of metabolism and to stimulate the latter to give two quarts of water or more a day—hot or cold, before breakfast, between meals and before retiring.

The arguments in favor of the copious drinking of water are supported by the good results obtained in such watering places as Carlsbad, Marienbad and Kissingen, whose waters are yearly sought by scores of obese patients. These waters, because of their mineral contents, also serve to keep the bowels open.

For a *Carlsbad Diet at Home* the reader is referred to Section I. For digestive difficulties tincture of nux vomica, dilute muriatic acid and pepsin are recommended, as well as pancreatic extract and ox-gall. Exercise, especially climbing, is much advised in connection with dieting. A pendulous abdomen can be reduced by surgical means in extreme cases without danger of life.

At the Glen Springs, *Watkins,* three standard diets [1] are employed in cases of obesity, varied according to the condition of the individual patient.

Diet in Uncomplicated Obesity

Breakfast.—Two soft boiled eggs or broiled steak (40 grams); zwieback or graham bread (75 grams); coffee (200 c.c.) with milk (20 c.c.).

Luncheon.—Consommé (100 c.c.); broiled steak or chops, cold roast beef, cold roast mutton, or cold roast chicken (200 grams); portion of salad

[1] As reported by Dr. A. W. Ferris, of Saratoga Springs.

with French dressing (made with lemon juice); zwieback or graham bread (25 grams); fresh fruit (150 grams); water (250 c.c.).

Dinner.—Beef, mutton, lamb, or poultry (200 grams); portion of salad with French dressing (made with lemon juice); zwieback or graham bread (25 grams); cheese (5 grams); water (250 c.c.).

NOTE.—Between each two meals 100 c.c. of water may be taken if desired. Total calories in 24 hours, 2,065. Total fluids in 24 hours, 1,100 c.c.

DIET IN OBESITY WITH CHRONIC JOINT DISEASE

Breakfast.—Small serving of broiled white fish, mutton chops, beef steak, or lean ham; one slice of well-toasted bread without butter; one cup of tea or coffee (8 ounces) with skimmed milk and no sugar (saccharin or glycerin may be used to sweeten).

Luncheon.—Small serving of cold chicken, game, beef tongue, lean ham, or one poached egg; small serving of any two of the following vegetables: spinach, lettuce, water cress, string beans, celery, turnips, parsnips, beet tops, cauliflower, artichokes; small serving of salad with lemon juice (no oil or vinegar); stewed or baked apple or pear without sugar or milk; no fluids.

Dinner.—Beef consommé or bouillon (8 ounces); small serving of broiled or boiled fish without sauce, broiled or boiled mutton, game or fowl (with little fat); same choice of vegetables as at luncheon; two gluten or almond biscuits; stewed fruit without sugar or milk; tea or coffee (8 ounces) with skimmed milk and no sugar.

DIET IN OBESITY WITH HIGH SYSTOLIC BLOOD PRESSURE

Breakfast.—Coffee (6 ounces), no cream or sugar; one soft boiled or poached egg (60 cal.); two thin slices of white, rye, or graham toast with no butter (150 cal.); one orange, one-half grapefruit, ordinary serving of strawberries, one peach or one apple (50 cal.). Total calories, 260. Total fluids, 6 ounces.

Luncheon.—Any two of the following: egg plant, asparagus, turnips, beets, spinach, cauliflower, string beans, Brussels sprouts (100 cal.); salad of any one or two of the following: lettuce, cucumbers, tomatoes, cabbage with vinegar or lemon (no oil) (50 cal.); one portion of the following fruits: cantaloupe, watermelon, strawberries, apple, orange, grapefruit (50 cal.); two ordinary slices of bread (150 cal.); four grams of butter (30 cal.). Total calories, 380. Total fluids, none.

Dinner.—Choice of chicken, broiled or roasted, or broiled fish (75 cal.); mixed pickles and celery (25 cal.); any two of the following: beets, turnips, cabbage, cauliflower, asparagus, egg plant, string beans, squash, green peas, onions (100 cal.); salad of any two of the following, with lemon or vinegar (no oil): cucumbers, tomatoes, cabbage (50 cal.); choice

of same fruits as at luncheon (50 cal.); two slices of bread with no butter (150 cal.); black coffee (4 ounces), without cream or sugar. Total calories, 450. Total fluids, 4 ounces.

Note.—Midway between each two meals 100 c.c. of water may be taken, if desired.

Obesity in Children

Pathological obesity in children may be associated with atrophy of the reproductive glands and is generally supposed to be primarily due to decreased function of the posterior lobe of the hypophysis, though other glands are doubtless involved in its causation.

Treatment.—If a radiograph shows a tumor or cyst of the hypophysis, pituitary extract or, preferably, the fresh gland may be tried, also pineal gland preparations. In a few cases compression of the spermatic cord by a truss has brought about improvement.

Surgical measures for tumor or cyst of the hypophysis have been practiced.

Lipomatosis Dolorosa

This condition consists in deposits of fatty masses or layers in various parts of the body. It is attended by pain or tenderness and presents *anesthetic areas* and, in the majority of cases, derangement of the thyroid gland. There may be various sensory disturbances, hemorrhages and general weakness.

Treatment.—The best results have been obtained by the long-continued use of thyroid extract, in doses of five to ten grains, one to three times daily. Under this treatment the fat deposits disappear, as is the case in myxedema, and the patient's general condition improves. If this fails *pineal gland* preparations may be given a trial.

Other forms of treatment such as the high frequency current afford at best only temporary relief. The pain may necessitate morphin.

Infantilism and Dwarfism

Definitions.—The term *infantilism* denotes a condition in which maturity of the genital organs fails to set in at the natural time. There is no change of voice at the time of puberty; the female breasts do not become round and full; there is no growth of pubic and axillary hair; and there is more or less dullness in the individual's emotional and intellectual sphere. Infantilism therefore is a conspicuous delay, arrest and imperfection of development. In *dwarfism* there is a serious arrest of growth.

Etiology.—Of the etiology we know nothing definite, except that in some cases the underlying causes are antenatal.

Types of Infantilism.—Cases of infantilism have been roughly divided into three groups:

(*a*) Idiopathic cases, which show no serious general or local disease.

(*b*) Cachectic cases, in which serious disease co-exists (tuberculosis, syphilis).

(*c*) Cases which are traceable to gross lesions of some important internal organ—the thyroid, the pituitary body, the pancreas and others.

Infantilism is not a prominent feature of the disease giving rise to idiocy or mongolism.

Treatment.—The general health and discovery of the cause should receive attention first. In thyroid infantilism the treatment is that of myxedema; in the pancreatic form pancreatic extract may be given either in tablets (gr. v to x twice a day) or Armour's Liquor Pancreaticus. As the treatment is otherwise unsatisfactory preparations of various internal secretory glands, including the thymus, ovarian, pineal glands, etc., may be tried in succession. Should a Wassermann test be positive, antiluetic treatment is indicated in addition to gland therapy.

FIG. 101.—ACROMEGALY IN A PATIENT THIRTY YEARS OLD. (After Strümpell, "Text-book of Medicine.")

Acromegaly and Gigantism

The pituitary body is a vital organ from which influences radiate, affecting the secretions of other ductless glands and affecting very many important physiological processes.

Total extirpation results in instantaneous death. Only the posterior lobe of the gland is subject to partial removal.

The pathology of the pituitary body comprises cysts, tumors, or changes due to infection. It has been demonstrated that there is to a certain degree a mutual compensatory relation between the pituitary and the thyroid,

the one showing enlargement or increased secretory activity when that of the other is inhibited, as in myxedema, goiter, etc.

The principal diseases associated with the pituitary gland are *acromegaly* and *gigantism*. Its influence, however, is noted in many other conditions, such as blood pressure changes, headaches, muscular weakness, sleeplessness, amenorrhea, diabetes, etc.

(a) Acromegaly

In acromegaly changes occur, not alone in the pituitary but also in other glands such as the thyroid, the thymus, the adrenals and the reproductive glands.

Whether acromegaly is due to hypersecretion or hyposecretion of the pituitary has not been settled, but it seems certain that if hypersecretion does occur in the adult the result is abnormal and irregular bone growth, especially of the hands, feet and face, with consequent deformity, i. e., acromegaly.

Prophylaxis.—In the present state of our knowledge no definite prophylactic suggestion can be offered.

Treatment.—It would seem that hypersecretion is the causal factor, for partial removal of the gland has resulted in the disappearance of acromegaly. Trephining may be tried for the headache.

Atrophy of the generative organs has been rather conspicuous, hence the administration of testicular or ovarian extracts seems rational. Some good results have been obtained also by the administration of the anterior lobe of the pituitary gland alone or in combination with an extract of the thyroid. The latter alone has also been used. Pineal gland therapy should also be given a trial.

Antiluetic treatment has led to improvement in a few cases and is indicated when the Wassermann test is positive. Blood transfusion as a remedial agent may be tried and can do no harm.

(b) Gigantism

Gigantism and acromegaly are closely allied, the one occurring frequently with the other.

Gigantism is apparently due to hypersecretion of the pituitary body; it is characterized by excessive growth of the skeletal bones before adolescence. In this circumstance is seen a connection with the deficient sexual development frequently observed. Hence ovarian or testicular extracts should be administered; also pineal gland therapy should be tried.

Sometimes infantilism goes hand in hand with gigantism.

Achondroplasia

Symptoms.—Achondroplasia in infants is characterized by curvature of the long bones and a disproportion between the length of the limbs and

the size of the body and head. The long bones are stunted but not soft, as in rickets, and the ends are only relatively enlarged as compared with the thinness of the shaft.

Diagnosis.—The disease has been mistaken for cretinism but may be distinguished from it by the absence of changes in the skin, by the physiognomy, and by the absence of alteration of the normal development of the mental processes.

Treatment.—Nothing apart from proper hygiene and diet has been found to be of any help, by way of treatment. Pineal gland preparations should be tried. If the Wassermann reaction is positive, the iodids or arsenical preparations are indicated.

FIG. 102.—ACHONDROPLASIA (CHONDRODYSTROPHY). (Courtesy of Dr. George Dow Scott, New York.)

Cretinism

Etiology and Symptoms.—Cretinism, also called infantile myxedema, is due to congenital absence or deficient secretion of the thyroid gland and is characterized by imperfect development of body and mind, imbecility and deformities, arrested growth of the long bones, and characteristic facies.

It is endemic in some places and may be associated with goiter. Among the contributing causes of sporadic cretinism are consanguinity, alcohol, lues and tuberculosis.

Clinical Forms.—There are 3 degrees of cretinism:

1. Cretins with vegetative functions, no reproductive or intellectual faculties including speech.

2. Semicretins with power of reproduction and some faculty of speech.

3. Cretinous individuals who are able in some degree to engage in trade and other employment.

Treatment.—If treatment is begun early the prognosis is very favorable. The treatment is that of myxedema, the medication employed being the extract of the thyroid gland. It is advisable to start with small doses (gr. i) three times a day. The results are little short of marvelous in

some cases, and partial success may even be expected in cases of long standing.

For reasons not quite understood a certain percentage of cases do not respond to this treatment. Inasmuch as we are unable to tell at the outset whether or not the thyroid treatment will favorably influence a case of cretinism, its administration is indicated in all cases.

Pineal and other gland preparations may be tried if thyroid therapy fails.

Young cretins are apt to become anemic under gland treatment, therefore it is wise to discontinue the treatment for the time being and resume it after an interval of a few weeks.

Myxedema

(*Hypothyroidism*)

Etiology and Symptoms.—Myxedema is a condition of profound disturbances in the general metabolism of the body, due to atrophy and impairment or loss of function of the thyroid gland. The body is generally swollen, the skin dry and rough, the facial expression stolid, the mental functions sluggish and the patient is morose, dull and occasionally suspicious. The speech is heavy and slow. As to the cause little is known.

If brought about by operative removal of the thyroid the condition is called *cachexia strumipriva.*

Treatment.—As the cause of the above condition is deficiency in the thyroid secretion, the indication for treatment is the administration of some thyroid gland preparation which leads to speedy improvement and cure if started at a fairly early stage. The thyroid extract should be given in the form of powder or tablet.

The adult dose, at first, is three grains three times a day. This may be gradually increased by one or two grains at a time: first once, then two and three times a day, until ten grains per dose are reached. Following this, symptoms of poisoning usually set in, manifested by increased pulse rate, palpitation, diarrhea, slight fever and excessive loss in weight. Medication should then be temporarily stopped, beginning again with small doses.

Most patients have to take a small dose of the extract for the rest of their lives. Removal to a warm climate is beneficial to the patient.

Acute Thyroiditis

Etiology.—Acute inflammation of the thyroid gland is occasionally observed and is probably of infectious origin, by way of the blood and lymph stream, taking origin from a septic focus elsewhere located.

Acute thyroiditis may also be associated with any of the acute infectious fevers.

Treatment.—External antiphlogistic measures should be applied in the beginning. If the nasopharynx is suspected as the portal of entrance, mild antiseptic measures should be directed to the nose and throat. In the event of abscess formation surgical measures should be instituted.

Simple Goiter—Benign Tumor—Cysts of Thyroid Gland

These conditions are usually not of serious importance as far as the general health of the patient is concerned, but they sometimes cause pressure symptoms and are objectionable chiefly from a cosmetic point of view.

Diagnosis of Simple Goiter.—Simple goiter which occurs sporadically and endemically should not be confounded with Basedow's or Graves' disease, because there is no evidence of disturbances of the internal secretions, and the enlarged gland does not necessarily result in hyperthyroidism; a simple goiter may, however, develop into Basedow's disease.

Etiology of Simple Goiter.—As to the etiology, little is known, beyond the fact that goiter bears some connection with the drinking water.

Forms of Simple Goiter.—Simple goiter occurs in the following forms: (*a*) the parenchymatous; (*b*) the vascular—so-called "pulsating goiter"; (*c*) the cystic.

Prophylaxis in Simple Goiter.—Prophylactically, the drinking water in regions where goiter is endemic should be filtered and boiled.

Treatment of Simple Goiter.—Because of a special affinity of the thyroid for iodin, the administration of iodin, either locally or by the mouth, often shows satisfactory results especially when given early in the disease. Iodin in the form of the U. S. P. ointment (fresh) or of one of the newer proprietary iodin ointments which leave the skin unstained is superior to the tincture. If for any reason internal medication is preferred, the sodium or potassium iodid may be given, beginning cautiously with small doses. Thyroid preparation is not recommended as a routine treatment in simple goiter. X-ray treatment sometimes gives good results.

If the deformity is great or if there are pressure symptoms, operative removal of the tumor may be recommended, which in experienced hands is not a matter of great risk—the mortality being only about 3 per cent.

Injections of Boiling Water.—The cure of goiter by the injection of boiling water into the substance of the enlarged thyroid is reported by Dr. John A. Wyeth of New York, as follows:

> The technic employed in a recent case at the Polyclinic was as follows: The skin and the area to be injected were thoroughly anesthetized by the injection of a free quantity of a one-half of one per cent novocain solution. One of my steel syringes, taken out of the boiling cauldron, was filled with boiling water, which was immediately injected by inserting the needle well into the substance of the mass. To prevent scalding the skin, as heretofore advised, the contiguous surfaces are shielded by a covering of towels, leaving only the point of injection exposed. As the steam or water is apt to escape from the needle, as it approaches

the skin, a gauze swab is held as a shield in front of the needle, which latter is thrust through and into the skin, when the contact is made. From 10 to 20 minims are forced out in one spot. The needle is then *partially* withdrawn, and the point carried to a new field, and the injection repeated.

Three or four such areas may be injected at one sitting, and these may be repeated as required, in one or two weeks, and so on, until the tumor disappears.

In the case in question, five injections were made in ten weeks, and in three months the goiter had entirely disappeared. The pain was insignificant. There is very little danger of having the water too hot. A Bunsen burner or an alcohol lamp held under the barrel of the syringe just as the needle is being inserted will insure a high temperature. It is advisable not to have the point of the needle immediately under the skin, as the excessive heat so directly applied may produce necrosis, which is apt to become a point of infection. If the skin covering remains intact, all tissue coagulation or destruction, being aseptic, is harmless, and the solidified mass gradually disappears by granular metamorphosis. It goes without saying that important vessels and nerves, as well as the trachea, should be avoided.

Basedow's Disease—Graves' Disease

(*Hyperthyroidism—Dysthyroidism—Exophthalmic Goiter*)

Etiology.—The disease occurs most often in females and between the age of puberty and the menopause. It is known to follow fright, shock, grief, and other emotional disturbances, influenza, quinsy, rheumatism, pregnancy. It may accompany or follow anemia, chorea, epilepsy, diabetes, acromegaly.

The *thymus* is often found persistent in exophthalmic goiter and may participate in its pathogenesis. In all probability a primary infection is the underlying cause. Occasionally myxedema sets in. In some cases there is increased *vagus* and in other cases increased *sympathetic tonus.*

Symptoms.—This condition is a systemic toxemia in which the following are the characteristic symptoms: thyroid enlargement, exophthalmus, palpitation of the heart, tremors of the extremities, nervous irritability, flushing, anemia, loss of flesh, digestive disturbances, etc. The basal metabolism is found to be increased.

Clinical Forms.—Two forms may be distinguished: the *complete* and the *incomplete.* In the latter one or more of the above signs are absent.

It may also be divided into a *fat* and a *lean* type. Patients who continue to lose flesh usually do not do well. Some cases develop on top of a simple goiter.

Prophylaxis and Treatment.—Lack of knowledge regarding the etiology of Basedow's disease gives us no viewpoint for practical prophylaxis.

In treating Basedow's disease many factors have to be considered. It is certain that various contributing causes do not affect all the patients in the same ratio or in the same degree, but with thoughtful treatment improvement or cure may be looked for, though long protracted illness and sudden death are not rare. The treatment consists in rest, hygienic and medicinal measures, hyperalimentation, electricity, x-ray, and operation.

Rest.—Rest in bed is of the utmost importance in severe cases. It should be absolute, at least as long as the patient continues to lose flesh.

Hygienic Measures.—The physiological processes may be stimulated by gentle massage and passive motion. (*See* Section I.)

Fresh air is of the greatest value. The patient may live in the open day and night, whenever possible, but exposure to the direct rays of the sun when sleeping should be avoided.

Fig. 103.—Exophthalmic Goiter (Hyperthyroidism).

A change from the city to, preferably, a cool peaceful place in the country—in the mountains or seashore—is often beneficial. Moderate exercise in milder cases is good—dancing, tennis playing, etc., *must not be indulged in.* Mingling with other patients, owing to the psychic impressions, has as a rule a bad effect. Sponging of the body with tepid water morning and night is very beneficial, also a warm bath, plain or salt water, the douche to the spine or the half bath. In severe cases an ice bag may be placed over the heart and anterior aspect of the neck during the daytime.

For elimination and *to combat auto-intoxication* enteroclysis at regular intervals, or better still, Jutte's lavage for cleansing the entire intestinal tract (*see* Section I) is an important part of the treatment.

Diet.—As to diet the patient's capricious appetite must not be catered to. The best diet is a plain mixed diet, and may include eggs, soup, good tender meat, broiled or roast fowl, fish, vegetables, stewed fruit, salads, bread or dry toast, butter, beef tea, a simple dessert, such as custard, sago or rice pudding—all of these and coffee and tea to be given in moderation. Pickles, fatty foods, sweets and alcohol should be *strictly prohibited.* It is well to "fletcherize" all food and to take the meals when the mind is calm or to dine in pleasant company. Milk from *thyroidectomized goats* is said to be of value in some cases but is of course difficult to obtain.

Electricity.—Electricity in any form is recommended. Some claim galvanism to be most efficacious, the anode being placed over the cervical

spine and the cathode over some of the peripheral nerves. Of late the high frequency current is being recommended more and more.

X-RAY TREATMENT.—The x-ray treatment is now generally employed with good results, for the reduction in the size of the thyroid gland and with a view of reducing hypersecretion.

PSYCHOTHERAPY.—With a view to relieve the distressing emotional and mental irritability, the physician should enjoin the family, and should himself endeavor, to display the utmost kindness, sympathy and hopefulness.

FIG. 104.—PATIENT WITH BASEDOW'S DISEASE (EXOPHTHALMIC GOITER). (After Strümpell, "Text-book of Medicine.")

MEDICINAL TREATMENT.—The medicinal treatment comprises a great variety of drugs corresponding to the multiplicity of symptoms. Quinin hydrobromate (gr. v) and ergotin (gr. i) in pill form, four times a day, are said to be followed by very good results. Milder cases often do well on these alone.

In severe cases, we administer tincture of belladonna (gtt. 10 to 15, three times a day); also bromural (gr. x twice a day). In the vagotonic form atropia is of great value. Iodin may be tried, as potassium-iodid, in 5 grain tablets, dissolved in water, three times a day, or syrup of hydriodic acid, three times a day, or iodin ointment locally to the goiter. Tincture of aconite and veratrum viride in combination (āā gtt. iii three times a day) have given good results as a heart sedative. In some cases iodin appears to be harmful. Iron and arsenic or phosphorus is indicated for the anemia. Sajodin is indicated if potassium iodid disagrees.

ORGANOTHERAPY.—In some cases, especially in those of long standing, thyroid gland preparations have given good results against all theoretical reckoning, but in the majority of cases no benefit has been observed. On the other hand administration of the *thymus gland* has proved more satisfactory generally.

Many good results and also some failures are reported from the employment of a rather expensive remedy called *antithyroidin* (Merck). The

dose is 10 to 30 drops, three times daily by mouth, for several weeks at a time. Another expensive substance called *rodagen*—prepared from the milk of thyroidectomized goats—is reported upon favorably; it is given in gram doses once or twice a day. Antithyroidin (Moebius) has given good results.

Suprarenal gland, ovarian and spleen extracts have been tried.

Surgical Treatment.—In as much as many of the milder cases (75 per cent) improve under medicinal treatment and in view of the rather high mortality rate we must use discretion in advising thyroidectomy. Many of the cases that survive have been greatly benefited by either complete or partial resection. Ligature of one or more arteries has produced less satisfactory results than excision.

Another surgical, but also risky, measure is resection of the cervical sympathetic. On account of the danger of death from general anesthesia, the operation may preferably be performed under local anesthesia.

The only conditions justifying surgical operations are *dangerous pressure symptoms* and *evidences of malignant changes in the goiter.*

Tetany

Etiology.—This condition occurs in both adults and children. In the latter it is definitely related to acute infections, gastro-intestinal disorders and rickets. *In adults,* it occurs in many disorders and vocations:

1. The epidemic tetany or rheumatic tetany.
2. Tetany occurring in gastro-intestinal disorders.
3. In acute infectious diseases.
4. In poisoning from metals and chemicals.
5. During pregnancy and after repeated pregnancies.
6. Following removal of the parathyroids in doing a thyroidectomy.
7. Complicating Basedow's disease, cerebral tumor, cysts of the cerebellum and syringomyelia.

Symptoms.—Tetany is an affection characterized by bilateral tonic spasms of the extremities, either paroxysmal or continued (carpopedal contractions).

Prophylaxis and Treatment.—Good hygienic management in health and disease is the only preventive measure in the present state of our knowledge. In the treatment of tetany the associated condition must be treated and removed if possible.

In *gastric tetany* stagnation and intoxication are favorably affected by gastric lavage at regular intervals. (*See* Section I.)

Intestinal intoxications may be treated by Jutte's lavage (*see* Section I) or enteroclysis or catharsis. Hydrotherapy is very helpful in the form of lukewarm baths or packs, as is also the ice bag to the spine.

Owing to rapid excretion of calcium an intravenous injection of a five

per cent solution of lactate of calcium (5i) has been recommended, which may be repeated in twenty-four hours. In milder cases this preparation may be administered by mouth in the usual doses.

By way of organotherapy parathyroid extract is administered in 1/20 to 1/10 grain doses or the parathyroid gland—raw (gr. $\frac{1}{3}$ to $\frac{2}{3}$ a day) or dry (gr. 2 to 3 a day). The thyroid gland also has been successfully employed in tetany.

Of the various electric currents only weak galvanism, if any, may be applied to the affected muscles.

Symptomatically potassium bromids (5i to 5ii daily), with chloral, should be given, or in severe cases chloral or morphin.

In two of the author's cases improvement and cure followed the hypodermic administration of fifteen drops of one-half per cent carbolic acid water daily for two weeks.

Addison's Disease

Etiology and Symptoms.—This is a disease attributed to changes in suprarenal glands and characterized by bronzing of the skin, with great loss of energy and strength, anorexia, gastro-intestinal irritability, loss of cardiovascular tone, nervous symptoms, etc.

Addison's disease may be primary from atrophy or cirrhosis of the suprarenal glands or secondary to malignancy, syphilis or tuberculosis—the latter being the most frequent cause. Hemorrhage into the suprarenal gland is occasionally found in Addison's disease.

Diagnosis.—If typical, the case is easily diagnosed, but there are instances in which either the pigmentation or the constitutional symptoms are absent or little developed.

Prophylaxis.—In the present state of our knowledge, prophylactic measures cannot be formulated.

Treatment.—Organotherapy has not given very satisfactory or lasting results. The most readily obtainable of the several preparations is the *adrenalin chlorid.*

The fresh gland of the sheep may be used instead—raw or slightly cooked—the dose being up to six glands a day, or the extract, about gr. ¼ three times a day. The effect must be watched. Grafting of the adrenal gland under the skin or into the peritoneum has proved a failure up to the present time.

Rest in bed for the asthenia and the open air treatment are salutary, but care must be taken to keep the patient warm.

Vomiting may be relieved by washing out the stomach and by such drugs as cerium oxalate (gr. v), bismuth or morphin; the *hiccough* by one or two drops of tincture of iodin in peppermint water; the *diarrhea* by bismuth, opium or similar drugs. In cases of *constipation* strong purges must be avoided.

The food must be plain and easily digestible and the patient should be admonished to thoroughly masticate it.

For the *anemia,* tonics, such as iron, strychnin and arsenic are to be administered; and for the *heart,* digitalis or *digipuratum*—one tablet, three times daily. In pronounced cases, with a downward course, *blood transfusion* should be tried as a remedial measure.

Thymus Gland Derangements

Etiology.—The mystery surrounding the thymus gland is almost as deep at present as it ever was, except that this organ is known to have a complicated internal secretion. The causes leading to anatomical and functional changes are likewise unknown. These changes are believed to be rather the cause than the results of pathological conditions occurring elsewhere in the body.

Normally the thymus is small, but actively functionating at birth it increases in size and activity up to the end of the second year, then remains fairly stationary during the third and fourth years and gradually diminishes in size until at puberty it practically disappears. It is believed to influence in some way the growth of the bones.

Hyperemic or hemorrhagic changes of the thymus, as well as abscess formation and tuberculous involvement, are observed occasionally. The etiology of thymus enlargement and of atrophy is not fully understood.

Symptoms.—Enlargement or hyperplasia of the thymus gland is the principal factor in the so-called *status lymphaticus.* The prominent features of the status lymphaticus are: pallor of the skin and well-marked development of subcutaneous fat. The enlarged gland may give percussion dullness over the manubrium sterni, especially with the child placed face downward, or a rounded swelling just above the sternal notch may be seen and felt. Frequently, there is also more or less well-developed dilatation and hypertrophy of the left ventricle of the heart and dyspnea and cyanosis from compression of the trachea.

Thymus enlargement is frequently overlooked or detected too late, that is, after sudden death from no apparent cause or so trivial a cause as fright, or even the most superficial narcosis.

Treatment.—After the diagnosis is made, calomel may be given in divided doses or potassium iodid may be administered locally in the form of 25 per cent ointment, one drachm of which is administered by inunction once a day. To guard against death from suffocation by pressure, careful attention should be given to the posture of the baby, as the enlarged thymus may fall backward when the baby is on its back, and be more apt to interfere with respiration and circulation. Fortunately we now have the x-ray therapy which diminishes the size of the enlarged gland as well

as its harmful hypersecretion. Ten treatments will usually ameliorate the condition. The baby should be kept under observation because the partially involuted gland is liable to degeneration; a second course of treatment should be instituted with the first return of symptoms.

Atrophy of the thymus gland is usually associated with infantile atrophy (marasmus) and may indicate thymus gland treatment. As a last resort to prevent or relieve pressure symptoms and suffocation partial resection of the gland is a justifiable procedure, notwithstanding the risk of sudden death in anesthesia.

Pineal Gland Lesions

Apart from tumors of the pineal gland, occasionally reported in literature, conditions of hypopinealism and apinealism are supposed to exist in many cases of retarded mentality in children, which have been remarkably improved by pineal gland therapy. The latter is supposed to accelerate the sluggish action of the brain. Dr. W. N. Berkeley of New York City gives the following directions for preparing and administering this drug:

Fresh bullock's glands are rapidly dried, mixed with milk sugar and put into capsules, each capsule corresponding to 150 lbs. of live bullock. The ordinary dose for a child, of 25-50 lbs., is one or two capsules a day after eating; the medicine must be taken for four to six months.

The same author reports excellent results from pineal gland therapy in arresting or delaying certain cases of premature breakdown of the mental powers of old age, in the absence of a distinct organic cause.

An interference with the metabolism of fat is often found in connection with pathologic states of the pineal body, the preponderance of evidence indicating that obesity is connected with a hypofunction of the gland. The changes due to disturbance of this function take place in young subjects, principally boys under seven years of age, and consist in abnormal tallness, unwonted growth of hair, premature sexual and mental development and early maturity. These changes usually are associated with symptoms of brain tumor and seem to depend in most cases on a destructive lesion or growth of the pineal body. It is evident that these changes are similar to those that have been observed in affections of the pituitary body.

Pineal Gland Preparations.—The following pineal gland preparations are now obtainable: pineal gland powder—1 grain equals 7 grains of fresh gland; pineal gland tablets—gr. 1/20 each.

Splenic Derangements

The most important pathological conditions presented by the spleen are chronic enlargement and Banti's disease.

Splenic enlargement occurring in connection with malaria, typhoid and other infections, leukemia, liver and heart disease, will be treated under their respective headings.

Treatment.—The drugs employed for reduction in the size of the spleen are quinin, mercury, iodids, arsenic and ergot.

Beside drugs other measures will be found salutary. Of these the static wave current, with a plate electrode placed over the enlarged organ, is most efficacious. Faradism with one pole over the spine and the other over the spleen may be used to advantage, if a static machine is not available. Expert massage, and hydrotherapy in the form of hot and cold douches given daily for one to three minutes, are also good.

Banti's disease, as yet of unknown but probably of toxic origin, from some agent elaborated in the spleen, has in a number of cases been successfully treated by splenectomy. If relief from the ascites is sought separately, aspiration may be performed (*see* Section I).

Of great comfort in the presence of an *enlarged or movable spleen* is a well-fitting abdominal support.

Surgically a movable spleen may be treated by fixation or excision or by the production of artificial adhesions by packing with gauze.

In connection with *general loss of fat and visceroptosis* the rest cure and forced feeding may result in great relief and in the replacement of the lost fat.

Abscess of the spleen demands surgical interference, and in the presence of an infarct the underlying cause will decide whether an operation is indicated or not.

In *injury with rupture of the spleen* laparotomy should be performed.

Blood transfusion in *anemia with splenic enlargement* is a recognized procedure (*see also* Section on Blood Conditions).

Gland Preparations

The following glandular preparations are now obtainable:

Brain substance	Pancreas	Spleen
Corpus luteum	Parotid	Suprarenal
Duodenum	Pineal	Thymus
Mammary	Pituitary	Thyroid
Orchitic	Prostate	Parathyroid
Ovarian	Spinal cord	

Senile Debility

When in the aged the organs and muscles, the senses and the mind, refuse to work with the old time energy and vigor, we speak of senile debility.

Various Forms.—There are two forms, one showing anatomical changes in blood vessels, muscles, tendons, bones, cartilages, etc., with lessened innervation, and the other, the psychic form, associated more or less with loss of fortune or family, disappointments, grief, loneliness, worry and idleness, and ending in loss of ambition, discouragement and despair.

Prophylaxis and Treatment.—The best way to prolong life is not to treat but to *prevent* senility. Those who can afford to, should, when still in possession of robust health—say, between the age of fifty and fifty-five—begin to take things easy, relinquish the strain of business for two or three months each year, and seek a warmer climate in the winter. Relaxing from cares, one will soon become interested in the gentle pleasures of life and adopt the pace most suited to the years. Senile changes are thus obviated or much delayed and life is prolonged.

When men and women reach middle age they should know their needs and limitations regarding food, alcohol, tobacco, sexual intercourse, exercise and work.

The food should be nutritious and plain, and contain a minimum of non-digestible elements and of lime salts. All foods should be well masticated, or at least be cut up into small pieces. Meat, meat broths and soups, milk, eggs, rice, salads, fruits, farina, sage and tapioca should form the staple articles of food. Digestion may be aided by giving dilute hydrochloric acid after eating.

Tobacco and alcohol may be used in moderation.

Luke warm baths are safer than cold baths for old people with hard blood vessels.

Sexual stimulation is beneficial as long as nature craves it, but moderation in ardor and passion at the time of the sexual act is a fixed rule for elderly men.

Daily exercise, including walking in moderation, is essential to the maintenance of good health. Horseback riding is a very desirable form of exercise. Motoring is an interesting pastime, but traveling over dusty roads is apt to induce bronchial and pulmonary catarrhs.

Massage of the entire body twice or three times a week is a powerful aid to a lagging circulation.

Sleeping out of doors on a well protected porch is a rejuvenator *par excellence.*

Oral sepsis and *vascular degeneration* are frequently responsible for

aches and pains in the aged. The teeth in such cases are usually decayed and loose and had better be removed.

The *management of arteriosclerosis* is discussed under that heading. Regarding the value of the *high frequency current* in hardening of the arteries, no definite indication has been formulated, notwithstanding the many assertions as to its curative and reconstructive powers. Its application to the entire body or to any part of the body is quite harmless and we may employ it on general principles. The same argument may be advanced for *radium* as a reconstructive agent and it may be offered as a psychical stimulant, if for no other reason.

Drugs for the old and feeble are not of much use. The iodids, strychnin salts and alcohol in moderation, are not without value in the circulatory disturbances of senility.

Insomnia is a distressing symptom in senility. For this complaint 20 grains of sodium bromid or 10 to 20 grains of bromural at bedtime should be administered. In the psychic form of senility 1/100 grain of hyoscin hypodermically administered at bedtime is apt to induce restful sleep.

When both psychic and anatomical changes manifest themselves in the aged, any improvement obtained by reason of well directed therapeutic efforts is apt to wear off very soon. An optimistic attitude of the physician and of the members of the patient's household is by far the best stimulant for very old people, for hope is a therapeutic asset for those whose mentality is sound.

Lapse of memory, defective hearing and sight may eventually change the disposition of the individual to one of childishness or moroseness—all of which must be met by infinite tact and patience on the part of the physician and members of the patient's household.

Melancholia with maniacal outbursts in senility is in many instances favorably influenced by 5 to 10 drops of the strong tincture of aconite given four times a day, until improvement sets in. Aconite acts as a vasodilator in this class of cases.

Finally we must draw attention to the pineal gland therapy mentioned in this section for arresting and delaying breakdown of the mental powers in old age, particularly in cases of premature mental failure *without a distinct organic cause.*

Section VII

The Digestive System

Transient and Chronic Derangements of the Digestive Organs

For minor ailments *see* Section XIII.

For tuberculous, syphilitic and malignant degeneration within the digestive tract *see* Section V.

General Remarks on Prophylaxis and Treatment

A *clean mouth* is one of the best prophylactics against the invasion of microbes, their putrid products and the profound constitutional disturbances resulting therefrom. In persons afflicted with prolonged indigestion, or suffering from chronic ailments with indigestion, the mucous membranes lose their integrity in consequence of malnutrition and offer but slight resistance to microbial invasion. Thus a mouth kept clean will be an aid in warding off complications frequently known to arise in the course of subacute and chronic ailments.

In the course of acute infectious fevers, less saliva is secreted, the mouth becomes dry and hot, and in this way local infection and invasion are favored. On the other hand pyorrhea alveolaris is responsible for grave systemic disturbances. Patients suffering from stomatitis and a putrid mouth, adenoids and diseased tonsils, swallow septic material and infect the deeper parts of the gastro-enteric tract.

As a prophylactic measure, the kissing of children on the mouth must be forbidden, carious teeth must be filled or extracted, adenoids and diseased tonsils must be removed; also mouth washes and gargles, being of great value, should be used. A proper hygiene of the mouth will often prevent toothache, stomatitis, alveolar abscesses and sloughing of the soft tissues. Acute inflammation of the *esophagus,* with possibly ulceration and stricture following, due either to mechanical, chemical or thermal traumatism, may be avoided.

A *healthy stomach* mechanically and chemically prepares the food for

the intestine, but dyspepsia does not always have its origin in the stomach; therefore not every case of dyspepsia calls for local treatment. When the stomach presents no motor or secretory disturbances, undue fermentation is due to quality and quantity of food, and can be avoided. Amylaceous dyspepsia will hardly exist in persons who chew slowly. Children can be guarded against ordinary forms of dyspepsia by adjusting their diet. Adults should learn to guard themselves. Putrid fermentation in the stomach is rare in the presence of free hydrochloric acid, hence its great value as a prophylactic and curative agent.

Hydrochloric acid favors proteolytic action of the pancreatic juice; therefore it aids digestion and its administration finds an additional indication by reason of this fact. The beneficial action of hydrochloric acid is not confined to the stomach, but is continued in the intestinal canal, when the combined acid acts as an intestinal antiseptic.

Alkalis neutralize gastric acidity and are supposed to stimulate gastric secretion. They are indicated in true hyperacidity and in peptic ulcer; also in some forms of dyspepsia with severe pain after eating. In fermentative dyspepsia with eructations of fatty acids, without pain, the administration of hydrochloric acid following a brisk purge is superior to the alkaline treatment, according to the writer's experience. Alkalis, on the other hand, are indispensable when lavage is practiced to dissolve mucus in the stomach. The beneficial effects of alkaline mineral waters (Carlsbad, Ems, Vichy, Saratoga) are most marked in cases in which diet, exercise, massage, hydrotherapy and freedom from worry are secured. Alkalis may be combined with morphin for the purpose of overcoming severe pain.

The *intestine* receives food and drink, secretions of other organs and also non-pathogenic and pathogenic bacteria, etc. Irritation of the intestines usually induces diarrhea. The timely and proper management of a mild dyspeptic diarrhea is frequently prophylactic of severe choleraic diarrhea—especially in children.

An invasion of the organism by bacteria is hindered by the intact epithelial lining of the intestine, but soluble products of bacterial action are absorbed and may offer to the organism a protection against the bacteria themselves.

A direct flushing of the upper intestine without the passage of fluid through the stomach is accomplished by means of *duodenal lavage* with the aid of a slender tube long enough to reach into the duodenum. Flushing of the lower intestine is attained by lavage from below or through a fistulous opening placed at the cecum. *Duodenal feeding* by means of a tube is as readily accomplished as feeding into the stomach with a tube. Nutrient enemata may tide over a critical period of a week or two. *Hypodermic feeding* has been practiced but is not to be advised.

Intestinal troubles are not infrequently complicated by nephritis—

particularly in children, this being due to the absorption of poisons or to the action of microbes. Prompt and well directed efforts to combat intestinal infection and toxemia may prevent serious damage to neighboring delicate structures—such as the pancreas, liver, gall-bladder, kidneys, ovary and bladder—with lessened resistance for the time being. The prevention and treatment of intestinal stasis and toxemia are prophylactic of many forms of constitutional malaise and undoubtedly have their influence in warding off a so-called *cholesterin diathesis,* which, according to newer investigations, appears to be a causative factor in gall-stone formation, though formerly believed to be solely due to gall-bladder infection.

Intelligent management of intestinal stagnation with putrid fermentation may ward off premature arteriosclerosis and lessen the dangers of appendicular swelling and inflammation.

The *non-surgical management of the gastro-enteric tract* can be summed up as consisting of:

1. Food adjustment as to quality and quantity with due regard to the natural craving of the individual.

2. Avoidance of stagnation or intestinal stasis by means of exercise and massage and the administration of laxatives. Surgical measures for the relief of intestinal stasis should be a *dernier ressort.*

3. The administration of a few drugs which specifically aid digestion by their action.

The best *intestinal antiseptic* is the active, peristaltic action of the gut itself plus hydrochloric acid given internally. The majority of drugs lauded as intestinal antiseptics are worthless.

Enteroptosis plays an important rôle as a causative factor in dyspepsia and malnutrition, for which the wearing of an abdominal binder or support is urgently demanded.

When the *motor efficiency of the gastro-enteric tract* is normal, we need worry but little about influencing or attempting to influence its secretions. Secretory disturbances are of secondary importance.

Acute Gastric Derangements

Starvation

Starvation produces not only complete exhaustion but also a condition in which food is not readily assimilated when eventually obtained.

Common experience has taught the actual danger of overfeeding a starving person, death having been frequently precipitated by so doing. There are a number of factors at work to effect such a condition. The primary one is the weakening of the intestinal tube due to its own activity,

without any reparative forces being effective, because of the lack of food material necessary for tissue upbuilding. The nervous system and heart are supported until the end by material abstracted from other organs in the body and the intestinal tract bears its part of the burden—especially the muscular coats and adipose deposits. Furthermore, the amount of water present is usually below normal and the tonicity and constitution of the tissue juices are altered so that glandular secretion is either reduced or otherwise abnormal. Therefore in commencing to feed a starving person we have to contend with very poor digestive juices, an intestinal musculature inadequate for propulsion of the material along the tract to prevent overdistention, a mucous membrane abnormally pervious to substances which, if reaching the general circulation unchanged, act as poisons —a perversion of the metabolic processes whereby the organism is subsisting by consuming itself, and an almost complete exhaustion of all the reserve forces on which the organism usually draws in emergencies.

Treatment.—By putting the patient in the recumbent posture, the heart is relieved of the labor necessary to maintain the blood column in the vertical position. Body temperature can be maintained from external sources, thereby curtailing another form of expenditure of energy.

The patient usually requires water and common salt in order to render the volume and tonicity of the blood approximately normal and thus permit of the physiological exchanges constituting the metabolic processes which should follow the ingestion of food. The easiest way for the system to take up these two substances is to introduce them by hypodermoclysis of normal saline solution. The rectum will fairly well absorb a half liter of normal salt solution under the conditions present and so enteroclysis may be substituted if deemed advisable. Saline by mouth is very objectionable, but when no other means are available, this may be given in the guise of a *clam broth* which practically amounts to the same thing.

The easiest food for assimilation and the quickest to be utilized is sugar, and of the sugars probably the ideal one is a monosaccharid like grape sugar which can be used without further alteration. Sugar given by mouth does not seem to be as well borne as when given in a five per cent solution per rectum.

Proteid food should be given in a very dilute and, possibly best, in a predigested form. Whey is an especially good initial nutriment as it contains about one per cent proteid—mostly in the form of lactalbumin which is very readily assimilated, usually less than one-half per cent fat, sugar to the amount of five per cent, about one-half per cent salts and the balance water. When it is found advisable to increase the nourishment, beef juice forms the next stronger type of food. The expressed juice of a slightly broiled steak contains about three per cent protein, one-half per cent fat, about three per cent extractives, one-fifth of one per cent salts which can be increased at will by salting, and the remainder water.

Broth is not a substitute for the above, because as ordinarily made its percentage composition is as follows: protein, one per cent; fat, not present if it has been skimmed; extractives, two per cent; salt, about one per cent; and the balance water. Therefore it is a poor substitute for whey.

Going a step further we have buttermilk which contains about three and one-half per cent protein, one-half per cent fat, about four per cent sugar, three-quarters of one per cent salts, some lactic acid, and water. Cows' milk contains about three and one-half per cent protein, four per cent fat and four and one-half per cent sugar, and can be modified by either simple dilution or by the percentage method, so that gradually increasing amounts of fat can be incorporated in the diet. Skimmed milk contains about three per cent protein, three-quarters of one per cent fat, four and one-half per cent sugar, three-quarters of one per cent salts, and water. Skimmed milk is subject to modification by the addition of cream which ranges from nine to twenty per cent fat content and so offers another means of regulating the fat in the food.

Still another method is to add butter or olive oil to the diet in fixed proportion. If necessary the fat can be emulsified and the milk or beef juice predigested.

There are many proprietary foods designed for invalids or infants that may be substituted for these various articles of diet which have been enumerated and may be preferred because of the ease of preparation and convenience of administration. Gelatin is an albuminoid food of high nutritive value and easily assimilated. Eggs should not be given early as they form too concentrated a food, containing about fifteen per cent protein, ten per cent or over of fat, and one per cent salts, the rest being water. Eggs require considerable digestive activity, and if cooked the demands are markedly increased in this direction. Starches should be withheld until the digestive functions have been reëstablished, and sugar, which is their end product during food conversion in the alimentary tract, should be substituted.

The patient may require active stimulation and the physician must use his judgment as to the nature of the stimulation necessary. It might be well to point out that strychnin is rarely indicated, as it markedly increases tissue waste. Adrenalin often has a splendid effect in sustaining sufficient arterial tension, and cardiac stimulants—of which atropin in this condition stands preëminent—may be indicated. Small doses rather frequently repeated should be given until the pulse responds rather than one large dose, as poisoning occurs very much more easily than in a well-nourished person with, of course, disastrous effects. Usually 0,0003 (gr. 1/200) every two hours for a few doses will be found amply sufficient.

It must be remembered that the weak spots in the organism may be permanently damaged while elsewhere there is practically a complete recovery, and no patient should be discharged who has suffered exposure and

starvation without a reasonable inquiry as to his organic efficiency. Many of the charges against hospitals for sending out patients insufficiently resuscitated arise from an unrecognized secondary affection which manifests itself a short time after the patient is dismissed. Pneumonia is probably the most frequently encountered sequel and cardiac and nephritic conditions form a large proportion of the rest.

Gormandizing

Gormandizing presents several phases dependent upon whether indulged in by a normal individual, one already having a markedly dilated stomach, or else a person suffering from cardiac, pulmonary or advanced arteriosclerotic conditions.

The normal individual usually voluntarily or involuntarily relieves himself of an "overloaded" stomach by vomiting, and all the medication necessary is a cathartic to clean out the surcharged bowel.

The *overfilled dilated stomach* presents a much more serious proposition. First of all, the actual amount of material present in the stomach may be so abundant that the resulting pressure on embarrassed vital organs may cause death. Again the digestive juices are entirely inadequate to convert the food ingested and thus more or less abnormal constituents become absorbed and produce a toxemia manifested by headache, lassitude and a highly charged urine.

Treatment.—A gastric lavage is usually indicated and then strong catharsis. Occasionally it will be found necessary to support the heart until it can be relieved of its added burden. This is accomplished by absolute rest in the reclining posture and by the administration of 10 to 20 drops of compound spirits of ether on sugar.

A word of caution is necessary also in regard to the too sudden emptying of the stomach with a stomach pump, as shock may be produced by the rapid lowering of intra-abdominal pressure just as occurs occasionally during the removal of ascitic fluid. Cardiac and pulmonary conditions may be unfavorably influenced directly by the added pressure and secondarily by the circulatory changes, the extent of which can be realized when we recall that the active stomach contains nine or ten times as much blood as in the quiescent state, and that the gaseous exchange occurring in the lungs rises from seven to thirty per cent for the absorption of oxygen and about six per cent in the output of carbon dioxid gas during digestion. If added to these conditions we have also an arterial system rendered inflexible by sclerosis, the imminence of a snap somewhere along the line of affected organs becomes plain. These facts already referred to and the attendant excitement of the occasion explain the frequent *collapses occurring during after-dinner speeches.*

Under such circumstances, one must not immediately jump to the

diagnosis of apoplexy, as frequently post mortems have failed to confirm the diagnosis and such cases have been ascribed to infinitesimal hemorrhages at some undiscovered vital point. There need not be a gross cardiac lesion either to supply the pathological condition for acute heart failure. In these cases there are only a few moments to act in and the physician, usually also a guest, finds himself entirely unprepared to meet the emergency unless he has been wise enough to carry a small pocket case, with necessary articles for such an occasion, or has left a more fully equipped bag in the coat room.

Left without his accustomed resources, the physician can do many things to aid the sufferer and prevent many other maneuvers which might be decidedly harmful. Everybody will be immediately struggling to loosen the collar or neck band, but will entirely neglect the tight trouser belt, or if it be a woman, the corset. In such an emergency the corset may be quickly loosened by reaching down the back and cutting the lacing strings or waistband with a pocket knife, thereby accomplishing the result without unnecessary exposure of the patient.

The patient should be put in the reclining, but not the prone position. This will allow the blood to drain away from the upper part of the body where the congestion occurs, as is attested by the flushed face and distended veins of the neck. A further relief of cardiac embarrassment may be obtained as long as the circulation is fair, by slipping the garters up on the thighs high enough to cause a retention of blood in the limbs on account of the increased pressure on the veins. If the head is abnormally hot an improvised ice cap can usually be secured and applied. The feet, on the other hand, are usually cold and clammy and should be warmed in any manner available. In the very severe cases of cardiac collapse, it is well to open the basilic vein with a pocket knife sterilized in a match flame or some burning brandy. The skin can be first wiped off with brandy or whisky and enough blood can be removed to perceptibly reduce the venous ingorgement. A strong cardiac stimulant is a mustard plaster which can be made on a napkin out of olive oil and mustard from the table and should be allowed to act just short of vesiculation over the left chest, hypochondrium or epigastrium. When the plaster is removed a piece of ice wrapped in several napkins should be laid over the same region. It may be necessary to aid respiration by the elevation and lowering of the arms, as outlined in the Sylvester method (Section I). No attempt should be made to empty the stomach until the heart action is fairly good. Retching from drinking salt or mustard water or the passage of a stomach tube, if such should be available, would probably too seriously accentuate the already existing depression. Possibly as good a way to empty the stomach as any if available, would be a hypodermic injection of 0,0065 grm. (gr. 1/10) of apomorphin. Sometimes it is the gaseous rather than the solid content of the stomach and bowels that is causing the trouble, which a little crème

de menthe will break. A glycerin suppository from a nearby drug store will afford relief from gas. As soon as practicable the bladder should be emptied.

These are merely haphazard suggestions but they carry with them the principle of quick utilization of the means at hand in meeting a crisis, when regular methods could only be applied too late. It is at such a time that the real physician can assert himself and the mere prescription writer fails.

Gastric Symptoms due to Temperature Variations

Temperature variations beyond physiological limits frequently cause acute gastric symptoms. Thermal burns of the gastric mucosa are rare; they may be produced in gastric lavage by using fluids which are too hot. Excessive cold on the other hand is often an exciting factor and acts unfavorably if the body is overheated when the stomach receives its chilling. An especially bad effect is produced by the rapid variation from heat to cold during a heavy meal. The effect of simple overheating or overchilling the stomach is to produce a marked hyperemia. Pain in the epigastrium and considerable prostration may result.

Treatment.—The treatment consists in the administration of alkalis to prevent the acid gastric juice from increasing the irritation, and this effect is enhanced if the medication is incorporated in a paste made of white of egg or starch, permitting of a more thorough coating of the congested mucosa. Pain and peristaltic unrest can be limited by opium.

A rapid change from heat to cold may have one of two effects, either there is a sharp muscular contraction causing cramps or vomiting, or else there is a paresis of the stomach and even of the adjacent bowel, with a rapid distention of the abdomen with gas. The pain in the first instance may be severe enough to make the patient feel weak, but in the second group usually profound shock followed by collapse from vasomotor paralysis manifests itself. In the first cited instance, atropin is of service and in the second adrenalin *per os*. Hot applications over the stomach may aid in the local congestion while strychnin hypodermically arouses a nervous reaction.

Gastric Disturbances Due to Variations in Consistency of Food

Variations in consistency may cause alimentary disturbances. An excessively dry meal, especially if it contain substances which easily cake and are not readily attacked by the gastric juice, may be the cause of severe distress for many hours, unless vomiting or the stomach tube bring relief. Should such a condition be suspected, we can often give considerable help by advising the use of charged mineral waters which dilute and break up the bolus. I remember a case accompanied by very marked

distress which was cured by the administration of the two parts of a Seidlitz powder given separately, thus allowing the evolution of gas to occur in the stomach. This condition most frequently occurs in patients with poor salivary secretion or a lowered output of gastric juice.

Abnormal fluidity of the gastric contents may be due to the nature of the food taken or to the amount of gastric juice present. In the first case the danger lies in the dilution of the gastric enzymes, the bulk of material and the ease of escape into the duodenum. The main symptom is postprandial griping and diarrhea, caused by the overfilling of the duodenum; accentuated, if large quantities of fatty matter are present, as is the case with soup eaters. The dilution of the chyme removes one of the elements necessary to stimulate pancreatic secretion, namely, acidity, and so intestinal digestion becomes affected.

This type of diarrhea simulates that produced by the intake of large amounts of coarse and indigestible food, but occurs much sooner after eating than in the latter case, and the stool is more fluid and contains less mucus than in the last condition. The fluidity caused by excessive secretion of gastric juice produces the well known group of symptoms described under the heading, Gastric Succorrhea, and will not be further dealt with here.

Treatment.—The treatment of these conditions is chiefly prophylactic by explaining to the patient the cause of the condition, so as to prevent a repetition, and by occasionally administering a cathartic or suggesting a binding diet as the case seems to indicate.

Gastric Disturbances Due to Changes in the Source of Drinking Water

Changes in the source of water used for drinking purposes are frequently charged with bringing on acute gastric attacks. When this occurs it is usually due to the water being contaminated by decomposing vegetable or animal matter, or to pathological bacteria. Sometimes the mineral content alone is sufficient to produce gastric symptoms and this is especially true of the chalybeate (iron) waters. The presence of considerable amounts of cathartic salts may lead to a diarrheal condition from the use of a water so impregnated.

The presence of organic material may be readily detected by the use of the following tests: Fill a large flask which has been thoroughly cleansed about half full of the suspected water. Stopper it and stand it aside in a warm place for several hours. If on removing the cork at the end of this time, there is a peculiar odor like that about stagnant pools, the water can almost positively be adjudged to contain a large amount of organic material. A quicker way is to acidulate slightly the suspected water with *dilute* sulphuric acid and add enough potassium permanganate

to give a light pink color to the mixture. If decolorization does not occur in fifteen minutes, only minute quantities of organic material can be present. It is to be noted that while *organic material* may not be demonstrable, the cleavage products of this may be found in large amounts in the shape of nitrites, nitrates, chlorids, sulphates, phosphates and ammonia.

A water may become unfit for drinking purposes because of the absorption of chemicals from containers, etc. The chief danger lies in the presence of lead and occasionally of arsenic.

The subject of water pollution and the prophylactic measures necessary to prevent contamination of natural watersheds, streams, wells, cisterns and reservoirs by sewage, surface or subsoil drainage from unclean districts, and the prevention of the admixture of mineral poisons during collection, transportation or storing, while vitally affecting the general health, forms too large a subject to be more than mentioned now.

Prophylaxis.—Boiling the water for half an hour will remove bacterial contamination and "soften" temporarily hard water, *i. e.,* water containing carbonates of calcium and magnesium. The ordinary small filter does nothing but remove more or less of the suspended matter but does not form a good safeguard. Charging water does not purify it either, as many of the pathological germs grow as well in carbonated as in still water. Rain water which has been collected in a cleanly manner and as a further safeguard has been boiled before using, forms the best soft water obtainable in most country districts and should be used for infants especially when visiting these localities unless a bottle of distilled water is procurable.

Gastric Disturbances Due to Acute Alcoholism

Acute alcoholism presents, as part of its symptomatology, marked gastric disturbance as evidenced by the initial nausea and vomiting and the later anorexia and epigastric tenderness. The local effect of alcohol on the gastric mucous membrane depends largely on the concentration and the form in which it is taken. Distilled liquors, when properly diluted, have less of a nauseous effect than the wines and malted drinks taken in excess. This is due to the presence of secondary constituents which go to make up the latter beverages.

Treatment.—The treatment of alcoholic intoxication should consist in emptying the stomach by lavage or induced vomiting, unloading the bowels with cathartics or enemata, insuring rest and freedom from exciting influences, quieting the delirium, if present, by nerve sedatives and stimulating the heart if its action becomes enfeebled.

As the more acute symptoms wear off the gastric condition comes into prominence. If a severe gastric catarrh has been engendered we had best rest the stomach for twenty-four hours before attempting to feed the pa-

tient. Small quantities of carbonated water usually are gratefully received and small pieces of ice may be sucked to relieve the intense thirst. Hot wet flannel cloths placed on the abdomen are also beneficial. Skimmed milk forms the best initial diet, and later broths and toast may be given.

Where it seems to be advisable to attempt some method of soothing an irritated stomach, probably the best way is to work bismuth subnitrate into a paste with aromatic liquid albolene and administer several teaspoonful doses at frequent intervals. This preparation incorporates itself with mucus on the gastric walls and cannot readily be dislodged even during active vomiting. When the acute symptoms have subsided and there is only a condition of anorexia remaining the following formula may be of service to increase the appetite:

℞ Tr. Nucis vomicae..... 8,0 ʒii
Tr. gentian co..... 60,0 ʒii
M.S.—Teaspoonful in water before eating.

Occasionally considerable bloody mucus is raised. Then a few drops of the standard solution of adrenalin chlorid (1 to 1,000) in water given every two or three hours will be of great service. Sometimes the pain may be severe enough to require morphin, but the dose should be small and should be given when possible by mouth.

Ptomain Poisoning

Passing on to another type of gastric irritation and toxemia, we find that food products may become poisonous through fermentative and putrefactive changes. Sausages, meat, fish, cheese and rotten vegetables form the chief nidus for the development of these poisons without the body. The vegetable fats and sugar split into various acid combinations which produce more or less gastro-enteric irritations, but the most important changes occur in the protein material, the end products being toxic and irritating to the nervous and circulatory system.

Treatment.—The treatment consists in clearing out the alimentary tract with calomel and salts and treating the symptoms as they arise as we might during the course of an infectious disease. Dilute hydrochloric acid in five to ten drop doses should also be administered to aid digestion. Auto-intoxication from putrefactive changes occurring within the body may be due to the abnormal amount or kind of saprophytic germs ingested or present, or to the long retention of the contents of the bowel. Here again clearing out the bowel has a most beneficial effect, and where the putrefactive elements are in the ascendant we may antagonize them by administering such rational enemies as cultures containing *lactic acid forming bacilli* (Bulgarian bacillus).

Gastric Disturbances Due to Food Preservatives

Gastric disturbances due to food preservatives, such as *sodium benzoate* and *borax* or to *pigment* and *adulterants,* are frequently observed in the acute as well as in the chronic form. As soon as their origin is made clear the treatment will be one of proper food selection, bowel regulation and the administration of hydrochloric acid and tincture of nux vomica.

Acute gastric disturbances, following *grief, worry* or *fear* are self-limited in otherwise normal subjects.

Acidosis and Vomiting

In childhood acidosis resulting from the production of abnormal acids is found chiefly in *diabetes,* in *recurrent vomiting,* and in certain forms of severe diarrhea.

In such cases there is labored breathing without cyanosis and a low carbon dioxid tension, as found by the Plesch-Howland [1] method. In normal infants the tension is about 35 points, while in acidosis it is 15 to 25.

A striking symptom of severe acidosis is *anuria.* Clinically acidosis may be defined as a condition in which an accumulation of acids occurs in the body, due to failure of elimination to keep pace with the production of acids, and resulting in a lowering of the bicarbonate content of the body fluids.

Acidosis is apt to develop in infants who are overfed on fats and are kept for a long time on a one-sided diet. It may also occur in conjunction with infectious diseases.

Dr. J. C. Hirst advocates the control of the vomiting of pregnancy by intramuscular injections of corpus luteum extract.[2]

Prognosis.—The prognosis in acidosis is grave. Periodic vomiting in neurotic children should not be mistaken for acidosis.

Prophylaxis.—Fats and milk sugar must be reduced by the dilution of cow's milk. Alkalies should be administered, and, during the intervals between attacks, a study of the blood chemistry is advisable.

Treatment.—Sodium bicarbonate in two per cent solution should be administered by mouth, by lavage, hypodermoclysis, enteroclysis, or the Murphy drip.

If, after an attack of acidosis, an idiosyncrasy for a certain food is suspected a scratch test can be made. If by any chance constitutional symptoms should develop, such food (egg, milk) should be eliminated from the dietary. The test should not be made until three to four weeks after an attack. (*See* Section I.)

Direct Transfusion of Blood in the Treatment of Hyperemesis gravidarum.—C. Viannay reports a case of incessant vomiting of preg-

[1] Alveolar Air Testing Outfit may be obtained from Hinson Westcott and Company, Baltimore, Md.

[2] Dr. J. C. Hirst, *J. Am. Med. Assn.,* Feb. 26, 1916.

nancy in which he practiced direct transfusion of blood from a normal pregnant woman. The vomiting stopped immediately. This method of treatment is based upon the method advocated by Le Lorier in 1911 and Freux and Dantin in 1912, by which the blood serum of a pregnant woman is injected into the vomiting patient. The latter method would commend itself by its greater simplicity.[1]

Acute Glossitis

Acute glossitis is infrequent in adults and very rare in children. It may accompany septic fevers or mouth infections and may be of traumatic origin or due to burns, insect stings, caustics, etc.

Treatment.—An antiseptic mouth spray (2 per cent boric acid) should be used frequently. Formamint tablets may be sucked. Nothing but liquid food should be taken. If swallowing is not possible the sufferer can be fed by means of a soft tube inserted through the nostril. In urgent dyspnea incision or tracheotomy may be necessary.

Acute Esophagitis

Mild esophagitis is occasionally observed as an extension of a neighboring inflammation and as a complication of septic fevers. Direct irritation from swallowed irritants is a more frequent cause, with a burning sensation and pain on swallowing as the symptoms.

Treatment.—A liquid bland diet must be enjoined as long as there is pain in swallowing (milk, cream, condensed milk, ice cream, water ice, cold water, etc.). Morphin in mucilage (gum arabic in water) or in oil emulsion may be necessary to relieve pain. If caustics have been swallowed bougies should be passed not later than ten days after injury to prevent cicatricial stenosis, if possible.

Acute Gastritis

Simple acute gastritis from errors of diet is frequently observed in infants; vomiting and a very high fever temperature and pain are pronounced symptoms. Adults complain of vomiting and pain, but the temperature plays no rôle.

Treatment.—A soapsuds enema should be given at once and no food allowed for twelve hours. Warm peppermint tea may be taken frequently, also boiled and cooled water. Lavage is a prompt remedial measure for cleansing the stomach. If vomiting persists we may give tincture of iodin in sugar water in drop doses every hour to infants and children or 10 to 20 drops of elixir of catnip. Adults should receive morphin (gr. 1/10) in carbonated water every hour until relieved. A hot water bag should be placed over the epigastrium after the symptoms have subsided. A non-irritating diet should be arranged and the patient should be told how to avoid similar attacks for the future.

[1] *Journal de Médecine de Paris*, 1912.

Résumé of Principles of Treatment with Formulary

Having now covered the more common causes of acute gastric disturbances, a word or two concerning the general plan of treatment applicable to all varieties may be in order.

The local condition is one of irritation or inflammation, the general condition that of toxemia or infection, and the chief symptoms pain, nausea and vomiting, diarrhea or constipation, malaise, anorexia and occasionally fever.

The first indication is to get rid of the exciting cause. This may entail washing out the stomach or bowel, inducing vomiting or purging. Next in importance are the supportive measures taken against shock and prostration. These include maintaining bodily temperature, the relief of pain and stimulating the heart and respiration when necessary.

The toxemia or infection may or may not be amenable to treatment directly, but will respond to eliminative measures—hydrotherapy, fresh air, etc. Local irritation must be soothed by the use of demulcents and soft diet, food restriction, counterirritation and occasionally opium against pain. Some of the appended formulae, applied properly, may be of service as indicated.

CATHARTICS

Laxative waters
Citrate of magnesia
Lapactic pills
Co. Cathartic pills
Calomel and Jalap.

℞ Podophyllin ..... 0,02 gr. 1/3
Calomel ..... 0,3 gr. v
Pulv. aromat. ..... 0,2 gr. iii
M.S.: One dose for an adult as a purge.

CARMINATIVES, ANTIFERMENTATIVES AND ANTIDIARRHEAL MIXTURES

℞ Ac. carbol. ..... 0,25 gtt. iv
Pepsin ..... 2,0 ℥ss
Pulv. carbo-ligni..... 4,0 ℥i
Ft. in cap. No. XX.
S.: One or two together with hot water.

℞ Chloroform ..... 0,3 gtt. v
Emuls. ol. amygdal... 30,0 ℥i
S.: One teaspoonful q. 3 hr. until relieved.

℞ Tr. opii ..... 4,0 ℥i
Tr. capsici ..... 4,0 ℥i
Sp. camphor ..... 4,0 ℥i
Sp. menth. pip..... 4,0 ℥i
Alcohol. dil.....16,0 ℥iv
S.: 30 gtt. in hot water q. 2 hr.

℞ Extr. cundurango fl.
Extr. quassiae fl....
Extr. cascara. sag. fl. āā 15,0 ℥iv
S.: 20 drops t.i.d. in sugar water.

℞ Tr. lavandulae co.... 15,0 3iv
Tr. zingiberis 15,0 3iv
Tr. cardamom co...ad 60,0 ad ℥ii
S.: ½ teaspoonful in water.

℞ Bismuth. subnitrat.... 8,0 3ii
Cretae praep..... 8,0 3ii
Tr. opii camph..... 8,0 3ii
Aq. destil.....ad 120,0 ad ℥iv
S.: Two teaspoonfuls q. 4 hr.
Shake the bottle.

Anti-emetics

℞ Tinct. iodi..... 1,0 gtt. xv
Aq. menthae. pip..... 50,0 3xii
Syrup 10,0 3iiss
S.: One to two teaspoonfuls every hour.

℞ Ac. hydrocyan. dil.... 1,0 gtt. xv
Sod. bicarb. 6,0 3iss
Sp. ammon. aromat.... 2,0 3ss
Inf. gentian co. q. s.
ad 180,0 ad ℥vi
S.: One tablespoonful q. 3 hr. to check vomiting.

℞ Cretae praep..... 2,0
Sod. bicarb..... 2,0 āā 3ss
Magnes. carb..... 2,0
Ft. No. X.
S.: One t. i. d. against hyperacidity.

Digestants

℞ Pepsin pur..... 4,0 3i
Ac. hydrochlor. dil... 15,0 3iv
Glycern. 15,0 3iv
Aq. laurocerasi..... 60,0 ℥ii
S.: Teaspoonful diluted after meals.

℞ Ac. hydrochlor. dil... 15,0 3iv
Tinct. nuc. vomic.... 15,0 3iv
S.: 10 drops in glass of water after eating.

℞ Papoid ..... 1,3 gr. xx
Bismuth subnit..... 4,0 3i
Ft. in chart. No. X.
S.: One powder with each meal.

For Gastralgia

℞ Tinct. opii.....
Tinct. castorei.....
Tinct. valerian. ether..
Aq. amygdal. amar. āā 10,0 3iiss
S.: 30 drops in sugar water every hour until pain is relieved.

℞ Chloral hydrat..... 4,0 3i
Sp. chloroform..... 20,0 3v
Aq. menth. pip. ad 120,0 ad ℥iv
S.: One teaspoonful every two hours until pain is relieved.

℞ Menthol ..... 0,3 gr. v
Spir. frumenti 20,0 3v
Aquae 40,0 3x
Syr. zingiberis 10,0 3iiss
S.: One teaspoonful t.i.d.

℞ Strych. nitr..... 0,06 gr. i
Acid. phosphor. dil.. 30,0 ℥i
S.: 10 drops in water t.i.d., between meals.

℞ Strychnin sulph..... 0,03 gr. ½
Ac. hydrochlor dil... 15,0 ℥iv
Glycerin ..... 30,0 ℥i
Tr. cardamon comp.. 15,0 ℥iv
Aq. laurocerasi..... 30,0 ℥i
S.: One teaspoonful dil. t. i. d. before eating.

Chronic Gastric Derangements (Non-Ulcerative)

Remarks on the Clinical Pathology of Chronic Gastric Catarrh

The term *chronic gastritis,* or *chronic gastric catarrh,* covers practically the whole gamut of non-malignant conditions which do not tend to early resolution and recovery. Many of the phases included within this title have received distinctive names, but we will not consider such apart from the one general picture, based on fundamental pathological changes. The milder grades of chronic gastritis give very few symptoms except during the acute exacerbations.

The one point which attracts attention to the case in the beginning is the ease with which the stomach can be upset. The patient usually expresses it by saying that he has *a weak stomach.* The usual progressive conditions developing in chronic gastritis are *irritation, inflammation, exfoliation and atrophy.* The symptoms vary with the stage, and arrest may occur at almost any time. Cures in the true sense are not always possible except in the early phases, but various means to compensate existing faults can be exercised provided the motor function of the gastro-enteric tract is not seriously hampered.

There is a very rare type of stomach condition which partakes more of a degenerative than an inflammatory character, in which a molecular death of the parenchyma is followed by a replacement fibrosis. Often no adequate extraneous cause can be found and, as might be expected, this type is found most frequently in the declining years of life.

The usual progressive type of *chronic gastritis* presents a different clinical picture. Before the final stage of atrophy is reached the symptoms are not marked or severe because of the ability of the pancreas and intestines to take over practically all of the gastric functions, provided the flow of chyme is unimpeded.

In the period of irritation of the chronically progressive form we have the following types of secretion: intermittent hyperchlorhydria, constant hyperchlorhydria, gastrosuccorrhea periodica and gastrosuccorrhea continua chronica. This means that the stomach at first reacts to the ingestion of food only on some special provocation, either chemical, mechanical or psychical, by hypersecretion. Later the habit becomes established so that no special provocation is necessary and with every intake of food hyper-

secretion results. Later still come periods when the stomach keeps up a continuous production of gastric juice irrespective of food intake and finally this condition becomes established without intermission. Usually the irritative phase does not progress as far as this but passes over into the inflammatory.

Although secretory disturbances undoubtedly have their origin in diet errors—alcoholism, excessive use of tobacco, iced drinks and bolting of food—it is well to remember that disturbances in organs adjacent to the stomach (appendix, liver, gall-bladder, kidney, pancreas) are not infrequently responsible for anomalies of gastric secretion.

An interesting feature in stomach pathology is the tolerance of the gastric mucosa to irritation. There is no epithelial tissue of the body, skin included, which can withstand so much abuse as the gastric mucous membrane. Another factor to be emphasized is, that while the stomach exhibits so much hardihood, the next succeeding portion of the alimentary tract is the most sensitive and that the stomach acts as a protection to it. This function is often demonstrated at autopsies on persons who have died of corrosive poisons, where the stomach mucosa is found to be practically eaten away and yet the duodenum has escaped with little or no injury. Of course there are poisons which cause no reaction in the stomach and so are allowed to pass freely into the intestines.

We are now led to a consideration of the reaction of the musculature of the stomach to stimulation. If the stimulation is gentle, the peristaltic action is increased (peristaltic unrest) and the stomach empties itself quicker than it otherwise would, but if it increases beyond this point, the pyloric fibers contract and go into spasm, which prevents the normal periodic relaxation and so shuts off the stomach contents from further progress. With very excessive stimulation we have a violent general contracture of the whole musculature producing cramps and, if retrogressive, vomiting. These are exactly the conditions which exist in hyperacidity: in the milder cases a rapid emptying of the stomach and in the severe cases a retention with its concomitant symptoms. Furthermore, overstimulation eventually leads to motor exhaustion. This factor affects the muscular apparatus before the secretory and the muscles of the gastric wall before those of the pylorus, so that eventually the stomach may dilate. The stimulative effects of excessive secretion will at first increase the appetite but soon the patients learn that the gratification of this desire causes increasingly more and more distress and they voluntarily starve themselves. Undernourishment, in its turn, brings on a train of symptoms due to malnutrition.

The slightly overacid gastric juice increases peristalsis in both bowel and intestine and so for a time there may be frequent movements of the bowels, but when the acidity becomes high enough to produce pyloric spasm and certain changes in the bowel, to be discussed later, constipation

results. The retention of a hyperacid chyme in the stomach produces pain first by its direct effect on the sensory nerve endings and secondly by the muscular cramp engendered. The stomach becomes restless and overactive from the abnormal conditions to which it is exposed and sour regurgitation (pyrosis) or vomiting results, more or less frequently, and a catarrhal condition of the oral mucous membrane is produced thereby. This, in a few words, is the clinical picture of hyperchlorhydria, or, as I prefer to term it, the irritative stage of chronic gastritis.

It can be well understood that with an abnormally acting musculature, a highly irritative content and marked retention, inflammation is the conclusive result. When inflammation sets in there is an increased hyperemia with exudation and infiltration into the stroma, and an increased output of mucus. Whereas the patient formally abstained from eating because of the fear of pain, now there is no appetite. Malnutrition with its attendant features becomes more pronounced and chronic constipation is established by this time. Pain is present but somewhat altered in character and follows immediately after the ingestion of food instead of some time later. Vomiting occurs but not so frequently. The amount of the vomitus is larger and of a putrefactive character. With a reduction of muscular tone, dilatation of the stomach takes place. The tongue, which may have been clean and red up to this time, becomes heavily coated and the breath which may before have been sour, now becomes foul.

This putrefactive change in the gastric contents, spoken of above, engenders toxins which on absorption cause headache, lack of power to concentrate, muscular pains, anemia and melancholia. If the pathological picture continues, exfoliation of the mucous membrane and general destruction of the glandular substance follows.

This condition of *gastric atrophy* may occur in patches rather than in the above generalized manner. Erosion and ulceration is a frequent complicating feature in chronic gastritis and manifests itself by occult or visible blood in vomit and stools.

Clinical Varieties of Chronic Indigestion

(*a*) The Weak Stomach
(*b*) Chronic Catarrh of the Stomach
(*c*) Chronic Nervous Dyspepsia
(*d*) Chronic Indigestion in Older Children

Treatment of Chronic Indigestion

(*a*) *The Weak Stomach*

The susceptibility to infection and to catarrhal conditions of the stomach is different in different individuals and thus we have clinically *weak* and *strong stomachs.*

The **management** of this condition implies: hygienic living, massage, hydrotherapy (cardiovascular douche—*see* Section I), adjustment of the diet, bowel regulation, the administration of dilute hydrochloric acid when the tongue is coated and an inquiry into the secretory and motor function of the stomach, if the ordinary well directed measures fail.

Diet in Chronic Gastric Conditions.—In selecting food for a dyspeptic, no strict rules can or should be followed. It is best to begin with a fairly liberal diet and not to overrule or ignore the natural craving of the individual for particular kinds of food. To begin with a liquid or restricted soft diet is in the writer's experience not desirable. Better results are achieved by offering a simple full diet with certain restrictions, advising the patient to eliminate any other articles of food found not to agree. Heavy meals are to be avoided by giving perhaps five small meals a day instead of three meals. Carbonated waters with the addition of a small quantity of whisky or wine; tea with lemon and sugar; champagne with a few drops of Angostura bitters; milk and Vichy may be taken.

The following *diet restrictions* apply to all forms of chronic indigestion:

Beans	Doughnuts
Peas	Fresh bread or biscuits
Lentils	Swiss cheese
Fried potatoes	Heavy sauces
Hard shell clams	Strong condiments
Pork	Ice cream
Nuts	Candy
Pastry	Soft drinks

Beer

When there is much intestinal putrefaction, meat and eggs should be cut out of the diet for a short time only.

Medication.—Regarding medication, dilute muriatic acid and tincture of nux vomica—five drops of each—may be taken in water after meals until the tongue clears up. Dyspeptic symptoms with a clean red tongue are favorably influenced by alkalis.

Lavage.—Lavage is seldom of benefit in this class of cases unless there is a hypersecretion of mucus. Carlsbad salt in hot water every morning before breakfast will overcome constipation; and outdoor exercises, cool sponging and abdominal and general massage are important therapeutic measures.

(*b*) *Chronic Catarrh of the Stomach—Primary or Secondary, With or Without Overproduction of Mucus; With or Without Atony, Dilatation and Stasis*

In this form of dyspepsia, frequently observed in adults, atony, dilatation and stasis, accompanied by the formation of gas and fatty acids, is

not due to pyloric stenosis; on the other hand, hyperacidity is often present.

Treatment.—The treatment of chronic gastric disturbances is a very broad subject because it involves the consideration of mechanical, chemical and psychical factors and a clinical grasp or ability to differentiate between primary and secondary phenomena. Dyspeptic conditions accompanying heart disease require no local treatment of the stomach, as a rule.

To get good results in chronic dyspepsia of the primary type an important decision must be made as to whether the patient requires rest and a change of environment, or some mind-diverting work. The point is that the patient usually has not energy enough to plan for himself any radical change in his mode of life and it has to be done for him. Now given this fundamental change in the way of living, there are certain measures and therapeutic aids which will facilitate matters. Patients should be warned against any bad habits they have developed, such as frequent nibbling of dainties, excessive smoking or drinking, bolting food, irregular meals and fancy diets, and a sensible mode of living and an ample but suitable dietary, corresponding to his walk in life, should be outlined. It is wise to suggest hydrotherapeutic measures, of which the warm bath at night and the cool sponge in the morning are perhaps the most practical.

One of the great advantages the better classes have over the poor is the custom of dressing for dinner at night, which allows the high tension of the day to subside and the relaxation from warm bath to become effective before the stomach is called into action. If the warm bath is directly followed by a cool sponge, fairly robust people will derive a distinctly tonic effect. The cold sponge removes that sense of lassitude and nervous depression which many of these sufferers experience, and so paves the way for a good meal.

Sleep is nature's nerve sedative. Rather more than the customary eight hours should be taken by dyspeptic people. Hand in hand with sleep must go a normal amount of outdoor life and exercise, and while this had best be taken in the day so that the added effect of the sunshine may be enjoyed, much benefit can be derived from an evening walk without fear of the evil effects of night air. In a few cases it will be found necessary to quiet the overwrought nervous system with bromids, valerian, trional, etc., until the other lines of treatment can have effect.

In true hyperacidity the administration of alkaline mixtures will temporarily neutralize the excess of acid and so alleviate the symptoms, but in the vast majority of dyspeptics who show a coated tongue, dilute hydrochloric acid is the corrective "par excellence."

Another way of overcoming hyperacidity is based on the exhaustion theory and consists of frequent feedings of albuminous foods which neutralize the acid by combining with it to form albuminates. Certain very intractable cases with excessive pain may require the use of cocain, morphin or chloral. It requires from 0,02 (gr. ⅓) to 0,05 (gr. 1.) of cocain or

0,01 (gr. 1/5) of morphin to get any effect. If this treatment is deemed necessary, it must be continued for a reasonably long time. The chief ways of avoiding a drug habit are by keeping the patient in absolute ignorance of the nature of the drugs used and by changing the menstruum frequently so that he does not ascribe any particular effect to any set prescription.

Alcoholism is probably the cause of gastric disturbance more often than any other special factor, and in accordance with modern ways of thinking, we will treat of it as a psychical condition.

The fact is not sufficiently recognized that the type of alcoholism has much to do with determining the kind of treatment. Probably the most common variety of excessive drinker may be termed the "convivialist" whose chief reason for drinking is to keep the "other fellow company." The true dipsomaniac who drinks because of an abnormal inordinate craving for alcohol is the least common variety. Both these conditions are very intractable because they represent innate mental peculiarities and require an entire change of character. There are a large number of alcoholics, however, who have become such because of chronic exhaustion, overwork or worry. This may have been brought about in many different ways, but the result is the same—the mind will no longer work and physical energy has disappeared. Sleep brings no refreshment and food does not seem to nourish. The sufferer craves stimulation and usually seeks it in liquor or drugs and the more he uses the more he craves and the less it stimulates.

These cases are the ones in which a cure is most often effected because there is no fundamental weakness or perversity of character or abnormal appetite. The desire for stimulation is the normal response to a physical need.

The ultimate aim of treatment is to nourish and procure rest for the patient until his recuperative forces can effect a cure, but the immediate indication is to make him feel better. The mind may be inordinately active. Absolute rest may mean torture; therefore we must order change of environment and occupation with removal of responsibility. A fair amount of sleep can be secured by the use of sedatives. Of these strontium bromid is one of the best, since large doses are tolerated by even badly upset stomachs. As much as 2,0 (gr. xxx) can be given two hours before bedtime to which 0,3 to 0,6 gm. of chloral hydrate can be added if necessary. Hot baths have also a soporific effect. At times it is advisable to allow a little whisky and water, especially if there is a marked lowering of blood pressure and the patient complains of chilliness and cold extremities.

In the morning the patient will be drowsy and slow to take on the activities of the day, and a little added impetus must be given to his movements. The cold sponge or bath is probably the best way of doing this, followed by a moderate breakfast and at least fifteen minutes in the open

air. Things will probably go on fairly well until about eleven o'clock when energy commences to lag. A little strychnia or nux vomica in a simple bitter, followed by a glass of milk or kumyss with a salt cracker, will relieve the depression and often create an appetite for luncheon.

About four o'clock another slump occurs and the same treatment as in the morning may be resorted to, or we may allow a moderate drink of whisky, provided the patient will take a glass of water first. This proviso is important because a drink of whisky is almost always taken in water or followed by the same, so that by insisting on a glass of water being taken shortly before the drink in addition to that taken with it, the liquor really reaches the stomach very much diluted. The evening meal must be taken after a little rest and the remainder of the evening spent in an enjoyable but not too exciting manner.

Passing on to the consideration of a more advanced stage of gastritis, we may encounter dilatation and gastric stasis of the nonobstructive variety. In this condition the stomach contents for one reason or another are retained within that organ until changes occur in the composition which produce irritants affecting the mucosa.

The most effective treatment is a *gastric lavage* once or twice a day to remove the stagnating material. The patient can be taught to do this for himself, but must be warned not to be overzealous in its application. The mucous membrane may at the same time be medicinally treated by the addition of various substances in the wash water. Bicarbonate of soda has a bland action while dissolving the mucus and should be used in the proportion of a heaping teaspoonful to the liter. Ichthyol (℥i to 2 quarts) is also employed for lavage. After a simple lavage to remove the stomach contents, a solution of silver nitrate—1:5,000 to 1:1,000—may be run in and out again or a 1:500 solution used through a gastric spray. When it is impracticable to directly medicate the gastric mucous membrane through a tube or spray one of the prescriptions given below may be utilized to produce an astringent effect.

℞ Argenti nitrat..... 0,25 gr. iv
Ex. hyosciam..... 0,6 gr. x
Ft. pil. No. XX
S. One pill ½ hr. before eating

℞ Argenti nitrat..... 0,3 gr. v
Aq. destil..... 180,0 ℥vi
S. One tablespoonful in wineglass of water
T.i.d. ½ hr. before eating

Occasionally this low grade inflammatory condition produces a state of anorexia or even distinct aversion to food, which may be overcome by

the use of preparations like those appended to a preceding part of this section.

Another factor in the maintenance of chronic dyspepsia is gastroptosis. If there is an obstructed circulation due to mechanical factors such as viceroptosis or dilatation, support from a proper *abdominal bandage* may give surprising relief. Should the dyspeptic condition arise from chronic cardiac or renal insufficiency the treatment must be in accordance. In hepatic insufficiency an aperient water given every morning induces a marked improvement. Hot stupes over the abdomen produce a local depletion which is beneficial. Adrenalin chlorid in ten drop doses of the standard solution (1 to 1,000) before meals has the same effect. During the acute exacerbations the case must be treated like a primary acute condition, i. e., restriction of food for a short period, followed by a bland fluid diet, gastric lavage, ice bag to abdomen, cracked ice to suck, relief of pain by analgesics and alkaline mixtures like those given under Acute Gastric Derangements in the forepart of this section.

Atrophy and Achylia.—Atrophy and achylia, as applied to stomach conditions, have an anatomical and a physiological significance. Anatomically it (atrophy) refers to the mucosa and musculature and grossly to the size of the stomach. Physiologically it (achylia) refers to diminished secretory functions. Treatment aims to stimulate whatever power still exists in the organ, to supply deficiencies of function artificially and to remove injurious secondary manifestations. The activities of the pancreas and intestine frequently make up for stomach deficiency. The following prescriptions fulfill some of these indications:

℞	Ac. nitrohydrochloric dil.....	16,0	ʒiv
	Tr. nucis vomicae.....	10,0	ʒiiss
	Tr. cinchon. comp.....ad	90,0 ad	ʒiii
S.	One teaspoonful t.i.d. after eating (diluted).		

℞	Pepsin pur.....	4,0	ʒi
	Ac. mur. dil.....	12,0	ʒiii
	Tr. mucis vomicae.....	6,0	ʒiss
	Elix. calisaya.....ad	180,0 ad	ʒvi
S.	One tablespoonful dil. t.i.d. before eating.		

Pancreatin in 0,3 to 1,5 gm. doses with sodium bicarbonate and papoid in 0,06 to 0,5 gm. doses also act as strong digestants when taken with food. When the stomach has become abnormally contracted it may be necessary to accomplish feeding by small frequently repeated meals rather than the usual method. Where pain is the chief symptom the following formulae may be of service:

℞	Ac. hydrocyan. dil.	1,3	gtt. xx
	Morphin sulph.	0,06	gr. i
	Syr. tolut.	30,0	℥i
	Aq.	30,0	℥i
S.	One teaspoonful q. 4 hr.		

℞	Chloral hydrat.	2,0	ʒss
	Sp. chloroform.	2,0	ʒss
	Aq. menth. pip. ad	60,0	℥ii
S.	One teaspoonful q. 4 hr.		

℞	Chloretone	**4,0**	**ʒi**
	Disp. in cap No. XV.		
S.	One to three t.i.d.		

(c) *Chronic Nervous Dyspepsia*

Chronic nervous dyspepsia is a generic name covering *sensory phenomena* such as hyperesthesia, gastralgia, bulimia, anorexia, *motor phenomena* such as peristaltic unrest, spasms, nervous eructations and vomiting, atony of musculature, insufficiency at cardia and pylorus, and *secretory neuroses* such as hyperacidity and hypersecretion, subacidity, achylia.

Neurasthenic individuals generally have some special organ which gives them and others much trouble. The stomach neurasthenic is a dyspeptic and hypochondriac combined, but in spite of all symptoms there is no stagnation in the stomach six to seven hours after a full meal. Epigastric tenderness is usually in evidence and in women a powerful throbbing of the abdominal aorta is frequently observed.

Treatment.—Our therapeutic management is practically the same as in other forms of chronic dyspepsia without obstruction:

Hygienic living
Hydrotherapeutic measures
Physical exercises; rest cure; work cure
Change of environment
Change of occupation
Massage; vibration; electricity
Wearing of an abdominal support
Lavage and enteroclysis
Diet

Medication: muriatic acid, alkalis, bitter tonics, laxatives, endocrin gland preparations, suggestion therapy.

Stomach neurotics usually feel comfortable while taking the following prescription:

℞ Sod. bromid..... 20,0 ʒv
Extr. guaranae fl..... 30,0 ʒi
Elix. tarax. co.....ad 120,0 ʒiv
S. One teaspoonful t.i.d.

For the details of management the reader is referred to previous articles in this section on Treatment of Chronic Indigestion.

Nervous dyspepsia is *not a proper field for surgical intervention.* In fact any form of treatment will frequently prove futile after its novelty has worn off.

(*d*) *Chronic Indigestion in Older Children*

The class of cases to be considered under this heading includes those of children who are off the bottle from two years up, also school children with chronic dyspepsia. They are pale, sallow, yellowish, and flabby and have no ambition or appetite. Some are constipated, others have liquid, offensive stools, or gray, pasty stools. The tongue is coated, the breath is offensive, and they are subject to follicular stomatitis, have bad teeth, and are extremely nervous and irritable, particularly if they have a nervous mother. They grind their teeth in their sleep. A *neurotic suppression of urine* is occasionally observed and attacks of constipation lasting a week may set in with stupor, slow, irregular pulse, simulating *intestinal obstruction* or even *meningitis,* and many other phenomena due to intestinal toxemia are observed. The temperature during such an attack is seldom above 102°, often normal or subnormal; the urine is brown from *indican.*

Associated with chronic indigestion we frequently find enuresis, reflex cough (adenoids), night and day terrors, vulvovaginal discharges, etc.

In all such cases a *careful clinical examination is called for in order to get at the underlying cause of the trouble* and be able to manage the case intelligently. This may involve a regional, blood, urine, and stool examination.

Etiology.—The underlying cause may be syphilis, tuberculosis, malaria, malignant disease, rhachitis, scurvy, diabetes, renal disease, hepatic disease, cardiac disease, or pulmonary disease, central nervous disease, atony of the stomach, constipation, faulty diet (indulgence in candy, nuts, soft drinks), constant swallowing of pus from chronic nasopharyngeal catarrh, adenoids, etc.

Neurotic parents are often responsible for the indisposition of the children by reason of keeping them indoors or in overheated rooms for fear of their "catching cold." The extreme of mismanagement was observed by the writer in a neurotic family as follows: The mother, with the aid of an accommodating medical talent, had a padded box stall constructed, five feet square and four feet high, closed on four sides. This was placed in

the middle of the nursery and the little "two year old" was kept in close confinement during the day in this box in custody of a trained nurse for seven months of the year, in order to prevent colds and cough, to which the child was subject. On careful examination this tendency to "catch cold" was found to be due to adenoid vegetations in the nasopharynx.

When the mother of a suffering child is not open to reason and the father is lucid, the physician should enlist the services of a nurse with diplomacy to manage the child properly, keeping the mother at bay. When both parents are dense, the case is almost hopeless, and the medical attendant will have to worry along or shift the responsibility to other shoulders.

Treatment.—The treatment of cases of chronic dyspepsia in older children involves, therefore, in addition to the dietetic management, a study of the underlying cause and *special treatment directed against the same.* Furthermore, we must seek to establish regular habits in the child and reduce the neurotic tendencies by a daily sponge bath.

The sleeping room should be cool and the living room not above 70° F. The child should be in the open air all day in fair weather and only come in for its meals. A change of climate is important in severe cases. The bowels should be made to move once a day, and massage of the abdomen or whole body should be performed daily. Older children should be sent to a gymnasium, and occasionally kept from school for a week or two when they appear fatigued or overworked. Gavage and stomach washing have their unpleasant features in older children with teeth, and will not as a rule be necessary. To aid digestion and overcome intestinal putrefaction, give

℞ Acid. hydrochloric dil..... ʒi
Ess. pepsin (Fairchild)..... ʒii
Tinct. quassiae..... ʒi
M. S.: One teaspoonful t.i.d.

Ichthyol in emulsion, in one or two drop doses twice a day, has given good results in some cases. A plain diet adapted to the age and condition of the child should be ordered. (*See* Diet List, Section I.) Cabbage, beans, raw fruit, pastry, cream, ice cream, sweets, soda water, etc., are forbidden. Maltine and cascara may be given to keep the bowels open, also enemata. The *underlying cause must be treated.* Iron, phosphorus, arsenic for anemia, quinin for chronic malarial disease (two to five grains every other day in a teaspoonful of compound elixir of taraxacum).

Diarrheal Disorders

Dyspeptic, Symptomatic and Inflammatory Diarrheas

Simple dyspeptic diarrheas are discussed in the section on Minor Ailments.

Symptomatic diarrhea is a term employed to designate *general catarrhal conditions* of the intestine of varying grades and occurring throughout the tract, with almost every acute infection and with many of the chronic diseases and diatheses.

The management of symptomatic diarrheas lies in a proper adjustment of the diet. At first a "binding" diet (*see* Section I, Bedside and Office Technic) should be selected and gradually this should merge into the restricted diet given under the heading, Chronic Catarrh of the Stomach, in this section. Dilute hydrochloric acid with nux or quassia will aid and stimulate digestion. A few doses of bismuth and krameria or tannin and opium may be necessary to check very profuse watery stools. A mild symptomatic diarrhea is in most instances a conservative effort of nature and energetic medication is not called for.

Acute Forms of Diarrhea in Children

Dyspeptic Diarrhea

The term *summer diarrhea* may be applied to this form, but should not be used in connection with gastro-enteritis, which is always catarrhal or inflammatory. The danger of a simple diarrhea in summer lies in the fact that it paves the way for severe inflammatory diarrheas, and its timely treatment prevents dangerous disease. Simple diarrheas are usually of nervous or dyspeptic origin. All forms of diarrhea are readily spread by the common house fly.

Prophylaxis.—Diarrheas can generally be prevented if the bottle food is sterilized before the warm weather sets in and if all food is screened against flies and other insects.

Treatment.—First *remove the cause.* Undigested food must be removed by administering a laxative, such as castor oil (one to two teaspoonfuls). In addition, the colon may be flushed. Calomel may be administered in half grain doses every hour until six doses are taken. The milk food, breast or bottle, must be stopped at once, and slimy gruel of barley or oatmeal, gum arabic water, white of egg in water or toast water given instead. The infant should be kept quiet and have good air. In summer a change of air is often a necessity from seashore to mountains or from mountains to seashore. In and around New York City, use may advantageously be made of the Staten Island ferry and Coney Island and Long

Branch boats for the sea air. Refreshing sponge baths should be given. Ten to twenty drops of whisky may be given in water several times a day as a stimulant in selected cases.

Drugs to check the diarrhea are usually not necessary. Should the stools remain liquid in spite of the above outlined management, the following may be administered:

℞	Bismuth. subcarb.	2,0	ʒss
	Aq. cinnam.	60,0	ʒii
	Tinct. opii.	0,12	gtt. ii

M. S. One teaspoonful every three hours.

Acute Gastro-Enteritis in Children

(*Cholera Infantum*)

Etiology.—Cholera infantum is due to bacterial infection from milk and food, and to the absorption of toxic products from fermentative and putrefactive changes in food, in the stomach and in the intestines.

Symptoms.—Fever, thirst, vomiting, diarrhea, cerebral unrest and prostration are the main symptoms.

Prophylaxis.—Bottle-fed infants should receive only sterilized milk in warm weather. When dyspeptic diarrhea develops, the milk must be stopped and substitute feeding should be given. (*See* Diarrhea.) If possible the patient should be taken to the seashore or mountains. Children should have a cool sponge bath several times a day and should receive plenty of cooled or boiled water to drink and should not be overfed. All food must be screened against insects (flies).

Treatment.—At an early stage no food should be given for six to twelve hours. Cool water, peppermint tea or black tea, to which may be added a few drops of whisky, may be given if a stimulant is needed. A laxative drug is hardly ever needed if vomiting and diarrhea have lasted over a day. When the time for giving food has arrived a few articles from the following list may be selected: cereal gruels, egg white in water, gum arabic in water, slippery elm decoction, lime water, bread water, mutton broth, cornstarch pap, burnt flour soup, etc.

If vomiting persists one drop of tincture of iodin in cinnamon water may be given every hour. If this fails the stomach must be washed.

Treatment is carried out on the following lines:

1. Quench thirst.
2. Give rest to the gastro-enteric tract.
3. Give non-irritating food.
4. Antifermentative medication.
5. Prevention and treatment of collapse.

To meet indications 3 and 4 the following prescription is offered:

℞ Bismuth subnitrat..... 4,0 ʒi
Aq. cinnam..... 60,0 ℥ii
Tinct. opii simpl..... 0,12 gtt. ii
M. S. One teaspoonful every hour or two.

This mixture may be given without syrup. Opium is contra-indicated when pulmonary edema is in evidence.

A towel wrung out of cold water and placed over the abdomen will relieve pain. A warm mustard bath stimulates an impending collapse. Stimulation must not be delayed until symptoms of collapse are marked. The most reliable stimulants are camphor, strychnia, caffein, enteroclysis; hypodermoclysis. (*See* Bedside and Office Technic, Section I.)

Milk feeding should not be resumed until the tendency to loose stools has subsided. To overcome this tendency to diarrheal stools during the period of convalescence, astringents should be administered by adding 4,0 (ʒi) of fl. extr. of krameria to the bismuth mixture or by giving the following powders:

Acid tannic..... 0,12 gr. ii
Pulv. Doveri..... 0,015 gr. ¼
Chocolad..... 0,3 gr. v
M. S. One powder 3 to 4 times a day.

Lozenges of tannate of quinia with chocolate have a pleasant taste and are readily taken by children.

In the severer form of choleraic diarrhea an early collapse is to be feared. In addition to the treatment laid down we may administer digitalis as follows:

Spir. frumenti..... 8,0 ʒii
Extr. digitalis fl..... 0,3 gtt. v
S. Ten drops subcutaneously every 4 hrs.

After complete recovery milk feeding can be resumed, if the milk be sterilized.

Acute Forms of Diarrhea in Adults

Acute Gastro-Enteritis in Adults

(*Cholera Morbus*)

Etiology.—This is a common disorder in hot weather, and is to be classed as an infection or intoxication due to putrid or poisonous gastro-intestinal contents and spoiled food and drink, such as canned goods, fish, shellfish, ice cream, milk, etc., or food which has been contaminated by flies.

Symptoms.—The symptoms are the same as in acute enteritis, but in addition there is vomiting on account of the participation of the stomach.

Treatment.—As the physician is generally called after vomiting has set in, an emetic is seldom necessary. In some cases stomach washing will be indicated. The patient should rest in a cool room with an ice bag to his head, he should have ice to quench the thirst and subdue nausea and vomiting, and he should not partake of food for the time being. Internally the following may be given.

℞ Tinct. valer. aeth.....
Solut. morph. magend. } ..... āā 4,0 3i
Aq. amygd. amar.....

M. S. Ten drops in ice cold carbonated water, every hour until relieved.

Lavage of the bowel will aid nature in eliminating foul material.

Diet.—For the first and second days the diet should be a bland binding diet. (*See* Bedside and Office Technic.) When the patient is fully convalescent, he can return to the ordinary food.

Prognosis.—The prognosis is favorable except in old and feeble people and infants, who sometimes die in collapse.

Enterocolitis

(*Follicular Enteritis*)

Etiology.—Acute catarrhal enteritis in adults occurs primarily or is secondary to various ailments, and should be looked upon as an infection or intoxication due to putrid intestinal contents, decomposed food, or some irritant poison. It is a common trouble in hot weather when food is apt to spoil or to be contaminated by flies.

Symptoms.—These are diarrhea, colicky pain, gurgling noises from gases, sometimes vomiting, a furred tongue, thirst, loss of appetite, scanty urine and occasionally fever. The duration is from three to eight days.

Prognosis.—The prognosis is favorable. In rare instances an apparently acute enteritis may develop into peritonitis with effusion, meteorism, and a rigid abdomen. Such cases are due to the perforation of a simple or tuberculous ulceration of the intestine or to the breaking up of a degenerated mesenteric gland.

Clinical Varieties.—*Duodenitis* is sometimes diagnosticated on account of the associated jaundice if the small intestine, jejunum and ileum is the seat of inflammation. The stools are flocculent and contain undigested food, unchanged bile and some mucus.

Colitis is characterized by marked pain, diarrhea, tenderness over the colon and souplike stools.

In *proctitis,* or *rectal catarrh,* there is painful tenesmus with mucus and pus in the discharges.

Treatment.—The treatment for this condition is rest in bed, evacuation of the bowels by castor oil (℥i) or a saline cathartic.

Bland Diet.—This consists of burnt flour soup, slimy soup, Vichy water, tea, toast, peppermint tea with tropon, raw eggs.

Medication.—Five drops of dilute hydrochloric acid should be given in water after eating; to stop pain, from five to ten drops of laudanum; to check persistent diarrhea, ten grains of tannin or tannalbin, with or without half a grain of opium, or the following prescription may be given:

℞ Bismuth. subnitrat..... 1,3 gr. xx
Pulv. opii..... 0,03 gr. ss
M. S. One such powder twice a day.

In *proctitis* the bowel is kept clean by means of clysmata, and tenesmus is relieved by suppositories of opium, belladonna extract, ichthyol and cocoa butter.

To aid nature in eliminating foul material, flushing of the bowels once or twice a day may be resorted to. (*See* Section I.)

In *follicular enteritis in children* we usually find blood streaked mucous stools. The dietetic, medicinal and hydrotherapeutic management is practically the same as in acute gastro-enteritis. Flushing of the bowel should be done several times a day during the acute stage. The prognosis is favorable in children over two years of age. In very young children the outlook is not as favorable.

Membranous Enteritis (Dysentery)

Clinical Varieties.—Membranous enteritis (dysentery) occurs in two specific forms: one produced by the Shiga bacillus and the other by the Ameba dysenteriae. Both varieties are essentially colonic infections. The Shiga bacillus type produces an intense catarrhal inflammation with superficial necrosis as its most common manifestation; the ameba variety is associated with infiltration and ulceration. In the ordinary form of dysentery the symptoms are bloody diarrhea with mucus, tenesmus and fever. This disease is often fatal in infants, whereas older children frequently recover.

Prophylaxis.—Preventive measures are the same as for gastro-enteritis. Stools and soiled linen should be promptly disinfected. Food should be screened against flies and other insects. Nurses should employ precautions as in typhoid fever cases.

Treatment.—Absolute rest must be secured. Diet and medication are the same as in *follicular enteritis.* Irrigations of the lower bowel twice a

day with boiled water containing salicylic acid 1 to 1,000 or ichthyol 1 to 1,000 are very useful. Argentic nitrate solution (3i to 1 pint) is also employed for bowel irrigation. To be of service these injections must comprise several pints of fluid and so it is usually necessary to quiet the rectum with an opium (gr. ½) and extr. belladonna (gr. ½) suppository before starting with the injections. For children one-tenth of this dose is sufficient.

Antidysenteric serum has been employed in 10 c.c. doses, injected hypodermically once or twice daily, but in the writer's experience the results have not been as satisfactory as proclaimed.

Externally, poultices, hot-water bags, cold compresses are gratefully accepted for their soothing effects.

Complications and Sequelae.—Numerous complications and sequelae have been observed and should be attended to as they develop. In cases of a subacute or somewhat chronic type, the administration of Bulgarian bacillus tablets is indicated. (*See* also Chronic Enteritis.)

Amebic Dysentery

This type of enteritis is successfully treated by the administration of emetine hydrochlorid, which can be given hypodermically in doses of 0,03 and 0,06 (gr. ½ to gr. 1) once a day or every other day. Apart from this the management is quite the same as in the ordinary form of dysentery.

Chronic Enteritis

Chronic Ulcerative Diarrhea

Etiology.—This is usually a sequel of repeated attacks of acute enteritis or dysentery, but it may develop in consequence of obstruction to the portal circulation in chronic hepatic or cardiac disease and in chronic malarial disease, etc. Syphilis or tuberculosis may be the basic cause.

Symptoms.—Diarrhea is present, or diarrhea alternating with constipation. The pain is not so severe as in the acute form. Mucus and undigested food are passed in the stools.

Diagnosis.—An ailment running a course as a chronic enteritis may have for its underlying cause syphilis, tuberculous ulceration of the intestine, or tuberculosis of the peritoneum. A careful clinical investigation will finally locate the trouble. This involves, beside the usual inquiries, an examination of the stools, an examination per rectum, a record of the temperature for two weeks, and an examination of the blood.

Treatment.—The underlying cause must be treated in the first place. Rest in bed, a bland restricted diet (including gum arabic mucilage) and intestinal flushing are indicated.

In malarial subjects quinin must be used; in syphilitic subjects, antisyphilitic treatment is indicated; in tuberculous subjects an out-of-door

life is demanded. When tuberculosis of the peritoneum is suspected, an exploratory laparotomy may furnish a positive diagnosis and afford relief and cure to the patient if the tuberculous infection is not a general one. The symptomatic medication in chronic enteritis is with bismuth, tannin and opium. If a local examination should show accessible ulceration in the lower intestine, local applications of silver nitrate or medicated water are useful, followed by extract of opium (gr. ½) and extract of belladonna (gr. ½) suppositories. In otherwise incurable cases the intestine may be flushed from above downward by transduodenal lavage or by establishing a fistulous opening in the right flank.

Before resorting to operative measures, a daily flushing of the intestine by means of the duodenal tube should be tried (*see* Bedside and Office Technic, Section I) after which two Bulgarian bacillus tablets may be given three times a day for a month or two.

Mucous Colitis

Symptoms.—This term is applied to a distinct clinical picture, the salient features of which are colic (not always pronounced) and spastic constipation and the passage of rather large quantities of mucus from the bowel at irregular intervals, in jelly form or in threads, and an associated intestinal toxemia. The stools are sometimes bloody and sandy.

Etiology.—Mucous colitis is a chronic colitis which was formerly looked upon as a neurotic manifestation. At the present time we are more in favor of attributing the phenomenon to irritation of the gut from a neighboring inflammation (chronic appendicitis, cholecystitis and pelvic disease) in otherwise neurotic subjects or in persons who have become neurotic by reason of the symptom complex under consideration.

Curative Treatment.—Well directed treatment implies the correction of any irritative process, be it intra-abdominal or intrapelvic, and this necessitates a searching clinical inquiry, in which our most advanced diagnostic technic should be employed.

Treatment for the "Colic Attack."—Rest in bed, hot applications to the abdomen, hot baths and atropia sulphate (gr. 1/50) with codea sulphate (gr. ½) administered subcutaneously over the seat of pain are the main points in treatment. Benzyl benzoate in 5 to 10 drop doses, well diluted, may be given. To clear out the mucus a full dose of castor oil should be given, also colonic irrigation with warm saline solution.

Prophylactic measures after the attack consists in giving a medium dose of castor oil twice a week or a daily dose of liquid paraffin. Bulgarian bacillus tablets can also be administered continuously for many weeks. The diet should be a restricted one, as outlined in the treatment of chronic gastritis, and good hygienic management should prevail throughout. An uplift belt or corset should be worn.

Intestinal Auto-Intoxication

Auto-intoxication is a term used to designate a toxemia from substances formed in the body through the influence of, or in consequence of, faulty metabolism or faulty digestion.

Gastro-intestinal Auto-intoxication.—Subjects of the latter form can be readily recognized by their yellow, drawn appearance, sunken eyes, yellowish conjunctiva; the appetite is apt to be capricious or absent, the tongue coated or brown; there may be dyspepsia, constipation or diarrhea, biliousness, impaired heart action, increased blood pressure, shortness of breath, asthma, chronic inflammation of the mucous membranes, neuroses, neurasthenia, melancholia and other mental disorders.

Intestinal Auto-intoxication.—This form is due either to excessive putrefaction of proteids or to excessive fermentation of sugars and starches, or to both.

Putrefaction can be readily detected by the indican test; fermentation can not. Much of the gas, alcohol and other poisonous substances is absorbed from the bowel.

Prophylaxis.—Moderation in eating, selection of plain food, thorough mastication, the drinking of plenty of water, attention to the bowels and outdoor exercises will effectually prevent auto-intoxication and its sequelae.

Treatment.—The modern treatment is comprised in modifying the intestinal flora and dieting, the administration of dilute hydrochloric acid after meals and the flushing of the bowels by lavage.

For the correction of excessive putrefaction the buttermilk and Metchnikoff treatment are much employed.

The latter consists in the introduction into the gastro-intestinal canal of the Bacillus bulgaricus which prevents excessive growth of harmful intestinal bacteria. The preparations come in liquid and tablet form and are taken with sugar, preserves, or sweetened water, once or several times a day, according to circumstances and for at least four weeks. The "lactobacillin" products made by the Ferment Company, New York, have the endorsement of Metchnikoff. Detailed directions for use in the various conditions are on each package.

The Bulgarian bacillus suspended in petroleum jelly has been introduced under the name of "cultol." In some of the author's cases its administration has been followed by good results.

Artificially soured milk, prepared with ferments, is made as follows: Boil one quart of milk for five minutes. Cool, place in four clean bowls, and to each half pint add one-quarter of a 10 c.c. vial containing the liquid ferment. Mix, cover and put in a warm place. Coagulation takes place within ten to twelve hours. This is to be taken in divided quantities in the course of a day.

Instead, the patient may take curdled milk, whey, pot cheese, kumyss,

kefir, zoolak, combined with farinaceous foods—such as rice, cereal flours, fruits—raw or cooked, vegetables, bread, toast, zwieback, plain puddings, as well as eggs, and fresh butter. Meats, fats, and pure milk—the latter especially in acute enteritis—should be avoided. Instead of a few large meals several small ones may be taken to advantage. Thorough mastication should be insisted upon, especially with a diet such as the above. At meals the fluids should be limited, that the food may become thoroughly impregnated with saliva.

Where excessive fermentation is present, it is advisable to restrict the use of plain milk and farinaceous food and instead to take a diet rich in food which does not ferment, such as meat, white of egg.

Attempts to disinfect the gastro-intestinal canal by drugs have usually failed, but much may be accomplished with dilute hydrochloric acid—5 to 10 drops after eating. Most of the other intestinal antiseptics are inert or are apt to cause more or less irritation.

Evacuation of the bowels is a very important part in the treatment of auto-intoxication. For this purpose a saline mixture known as *anti-autotox mixture* is efficacious. Half a wineglassful should be taken daily before breakfast. The market is glutted with laxative salts and waters. Castor oil in the evening, followed by a saline cathartic in the morning is an old and proved measure, and, combined with colonic irrigation, treatment is most efficacious.

Gastric lavage is often distinctly helpful, especially when there is much belching.

Digestion and assimilation may be stimulated by giving pepsin and dilute hydrochloric acid.

To stimulate the functions of the kidneys and the skin, we employ intestinal irrigation at 110° or give hot drinks. Turkish or Russian baths may be prescribed to patients with sound hearts. Spa treatment in one's own country or abroad, with its diet regulations, graded exercises, mineral waters, hydrotherapeutic maneuvers, pleasant pastimes and enforced absence from business cares and other troubles is indicated for the well-to-do, who by force of depressing circumstances and environment get no benefit at home.

Hemorrhage, Erosion and Ulcer of the Gastro-Enteric Tract

Hemorrhage of the Gastro-Enteric Tract

Hemorrhage of the Mouth

This condition is discussed under the heading, Minor Ailments (Section XIII).

Bleeding from the Esophagus and Stomach

This condition may be due to rupture of a varicose vessel or to an ulcerative process or to traumatism. It may be slight or profuse. Hemorrhage as the immediate cause of death is rare (3 per cent). Congenital and acquired hemorrhagic diathesis is also a cause of hemorrhage.

In a *visible hemorrhage* we first make sure that blood from the nasopharynx has not been swallowed and vomited.

Treatment.—The treatment for the time being is symptomatic. It includes rest in bed, an ice bag over the epigastrium, cold water held in the mouth and expelled—not swallowed—to quench the thirst, morphin (gr. ⅛ to ¼) and atropin (1/200) hypodermically repeated every three to six hours if necessary. A few ounces of alum water may be given by mouth. Hemostatics by mouth are not of much value. Ergotin may be given hypodermically in 2-grain doses. If the hemorrhage persists, 50,0 of sterile blood serum should be injected under the skin, or blood transfusion may be done. A dry blood serum under the name of *coagulose* is now in the market. A ligature should also be placed around one or two extremities and in actual collapse a saline infusion should be given.[1] Surgical aid has not reduced the mortality from hemorrhage. Nourishment should be administered by rectum during the first few days, and no food should be given by mouth until twenty-four hours after the bleeding has stopped. Very small quantities of liquid food may be given at frequent intervals, according to indications.

Hemorrhage from the Bowel

Hemorrhage from the bowel may be due to hemorrhagic diathesis, varicose veins, ulcer, foreign body aneurism, vicarious menstruation, swallowed blood, hemorrhoids, etc. An exact diagnosis is arrived at by exclusion.

Treatment.—The treatment for the time being is absolute rest; fluid diet; ice coil over abdomen; acetate of lead 0,12 (gr. ii) and opium 0,03 (gr. ½) internally three times in twenty-four hours. Blood serum or coagulose may be injected subcutaneously (*see* Gastric Hemorrhage) and blood transfusion may be done.

Bleeding from the lower bowel is sometimes controlled by a clysma of one pint of ice cold water holding 5i to 5ii of alum or 5i of tannin in solution. A tampon of the actual cautery may be required and in urgent cases surgical help is indicated.

[1] Lavage of the stomach with warm water will occasionally check gastric hemorrhage where all other methods fail.

Ulceration in the Gastro-Enteric Tract

Ulcer of the Tongue

This condition is discussed under the heading, Minor Ailments, Section XIII.

Ulcer in the Esophagus

Simple ulcer in the esophagus is rare. The etiological factor may be thrombonecrosis in scurvy, in fevers, or in extreme debility from chronic disease. Swallowing acids, caustics and spicule of bone may cause ulcer, or the forced passing of a sound may do the damage. Except in the tuberculous, malignant, or cachectic variety, ulcers have a tendency to heal in a reasonable time. Ulcers from regurgitation of acid stomach contents are very rare.

The symptoms are pain, dyspepsia, vomiting, regurgitation, hemorrhage. A positive diagnosis can be made by means of the esophagoscope.

Treatment.—Rest, rectal feeding, morphin by mouth in mucilage or in milk of magnesia, ichthyol in sugar water or cream. Ice over the manubrium is the immediate treatment. A subsequent cicatricial stenosis may require dilatation. Luetic ulcers heal under specific treatment.

Peptic Ulcer—Gastric and Duodenal

(*a*) Gastric Ulcer.—The etiological factors are traumatism, coagulation necrosis, chlorosis, arteriosclerosis, circulatory disturbances, hyperacidity, hypersecretion.

The symptoms are pain—made worse by eating—anemia, hyperacidity and hematemesis in fifty per cent of cases.

(*b*) Duodenal Ulcers.—Duodenal ulcers may be divided clinically into two groups. In the first group are found ulcers situated close to the pylorus and having the same etiology as gastric ulcers. The other division includes ulcers found below the papilla of Vater. There is a natural point of lowered resistance in the duodenum, due to the fact that it is here that the primitive foregut and hindgut anastomose and space exists in which the blood supply is by terminal arteries and rather poor. Spasm or obstruction of these vessels or a marked reduction of blood pressure may affect the nutrition of that part of the gut and establish a *locus minoris resistentiae* against the action of the digestive ferments and of intestinal bacteria. Other factors which have been looked upon as predisposing are congenital narrowing or kinking of the bowel. Irritating secretions from a diseased gall-bladder and the passage of gall-stones and enteroliths may also favor the development of the condition.

Clinical Varieties of Peptic Ulcer.—1. Light attacks with pain; hyperacidity, pyrosis; no hematemesis.

2. Severe attacks with hematemesis.

3. Old chronic, latent and relapsing cases with occasional hemorrhage.

Prophylaxis.—Early and appropriate treatment of hyperacidity and hypersecretion may prevent peptic ulcer. Hygienic living is effectual and occasionally a change of environment and occupation is necessary.

Prognosis.—There is a general tendency of peptic ulcer to heal under a treatment which is directed against hyperacidity and hypersecretion. In a small percentage of cases death from hemorrhage or from perforation and peritonitis may result. Ulcers may heal with cicatricial contracture and cause obstruction.

Principles of Treatment in Peptic Ulcer

Rest in bed for four to six weeks.
A bland non-irritating diet.
Bowel action.
Bismuth subnitrate medication. Morphin and atropin when indicated.
Special attention to minor symptoms.
Gavage, rectal feeding and duodenal feeding in selected cases.
Lavage in certain cases.
Surgical intervention in intractable cases.

Diet in Peptic Ulcers.—The diet should consist of the following: milk, condensed milk, cream, cornstarch pap, slimy gruel, well cooked cereals, burnt flour gruel, tropon in tea or in peppermint tea, beef jelly, calf's foot jelly, egg, white of egg, custard, junket, watercress. After three to four weeks scraped or chopped lean meat, sweetbreads, farinaceous puddings, etc., may be given. Supplementary rectal feeding may be required. The basis of the diet should be milk, cream, eggs, cereals and vegetable purées and later on lean meat.

The *Lenhartz* diet with bismuth treatment is given in the section on Bedside and Office Technic (Section I).

Dr. B. W. Sippy of Chicago claims excellent results from the following management:

Three ounces of a mixture of equal parts milk and cream are given every hour from 7 A. M. until 7 P. M. After two or three days soft eggs and well-cooked cereals are gradually added, until at the end of about ten days the patient is receiving approximately the following nourishment: 3 ounces of the milk and cream mixture every hour from 7 A. M. until 7 P. M. In addition, three soft eggs, one at a time, and 9 ounces of a cereal, 3 ounces at one feeding, may be given each day. The cereal is measured after it is prepared.

Cream soups of various kinds, vegetable purées and other soft foods may be substituted now and then, as desired. The total bulk at any one feeding, while food is taken every hour, should not exceed 6 ounces. Many of the feedings will not equal that quantity. The patient should be weighed. If desired, a sufficient quantity of food may be given to cause a gain of 2 or 3 pounds each week.

A large variety of soft and palatable foods may be used, such as jellies, marmalades, custards, creams, etc. The basis of the diet, however, should be milk, cream, eggs, cereals and vegetable purées.

The acidity is more easily controlled by feeding every hour and giving the alkalis midway between feedings. The acidity may, however, be controlled by feeding every two, three and four hours. I have maintained complete control of the free hydrochloric acidity in several cases by feeding three times daily. In most cases, however, the plan of feeding every hour is best.

Cases of stomach ulcer unassociated with stagnation of food and secretion are usually controlled by feeding every hour and giving a powder containing 10 grains each of heavy *calcined magnesia* and *sodium bicarbonate,* alternating with a powder containing 10 grains of *bismuth subcarbonate* and 20 or 30 grains of *sodium bicarbonate,* midway between feedings. Cases of pyloric and duodenal ulcer that have been associated with stagnation of food and secretion longer than two months almost invariably require larger quantities of alkalis.

Strict adherence to any routine diet schedule is unnecessary. We must individualize as in infant feeding and select food which passes through the stomach without irritating it.

Duodenal Feeding in Peptic Ulcer.—*Duodenal feeding* (*see* Section I), as recommended by Dr. Einhorn of New York, delivers the food directly into the intestine and has found considerable favor in treating gastric ulcer. Whether or not this method is superior to the ordinary way of feeding in peptic ulcer, time and experience alone can demonstrate.

Lavage and Gavage in Peptic Ulcer.—In cases with persistent vomiting it may be necessary to employ hot water lavage and feed by gavage after the stomach has been cleansed.

Medication for Peptic Ulcer.—The alkalis employed for neutralizing the acidity of the gastric contents should be used liberally:—

Bismuth subnitrate 2,0 (gr. xxx) three times a day with or without opium.

Calcined magnesia 0,6 (gr. x) between feedings.

Sodium bicarbonate 0,6 (gr. x) between feedings.

In active ulceration the stomach wall can be "whitewashed" with a paste made of bismuth subnitrate suspended in aromatic liquid albolene or in olive oil. This sticks so tenaciously that very little is returned even when vomiting occurs.

Any of the simple alkaline mixtures may be given at frequent intervals to neutralize the gastric juice. Opium, morphin, codein may be given to allay local discomfort or pain. They can be given by mouth *per se* or mixed with the alkali which is taken between meals.

Morphin can be given hypodermically. The "drug addiction army" is largely recruited from the ranks of stomach neurotics and great caution and tact on the part of the physician are necessary in offering sedatives to weaklings.

Chloral hydrate, with or without *sodium bromid,* is efficacious in over-

coming local pain and general nervousness. It may be given in an emulsion as follows:

℞	Chloral hydrat.....	8,0	ʒii
	Sod. bromid	8,0	ʒii
	Emuls. ol. amygdal.....	120,0	ʒiv
	Aq. amygd. amar.....	8,0	ʒii
M. S.	One tablespoonful every 4 hrs. until relieved.		

Menthol in ginger ale 1,0 ad. 150,0 teaspoonful every 3 hours may be given to relieve pain.

Atropia as a powerful inhibitor of gastric secretion is given internally 0,01 to 10,0 water. The dose is 5 drops 3 times a day, increasing the dose each day by one drop until its physiological action is manifest.

Horse serum in 60,0 (ʒii) doses given subcutaneously is supposed to raise the clotting index of the blood, and may therefore be administered in hemorrhagic cases.

Silver nitrate treatment in gastric ulcer has for its object the reduction of gastric hyperesthesia. To get the best results, it should be given by lavage 2,0 ad 2000,0 (ʒss—2 quarts) every other day to once a week, for a long period.

Carlsbad "Cure."—This treatment, which is suitable for the convalescent stage of peptic ulcer, can be secured at home by drinking the warm natural or artificial Carlsbad water every morning before breakfast or by taking the natural or artificial Carlsbad salt in teaspoonful doses dissolved in hot water.

Oil Treatment.—Pure sweet oil is taken in tablespoonful doses before each meal and good results have been obtained thereby. This treatment should not be forced upon individuals who become nauseated after swallowing oil.

Thermic and Hydrotherapeutic Measures.—The hot and cold water bag is extensively used over areas of congestion and of pain; poultices also are helpful. A *neptune belt* is a Turkish towel wrung out of cold water and worn around the upper abdomen over night.

A spray or douche along the spine of various degrees of temperature and force is an important method of cardiovascular stimulation and should always be employed when feasible in the convalescent stage. (*See* Sec. I.)

Gastric and Duodenal Lavage.—*Gastric lavage* is given to control hemorrhage and frequent vomiting—to carry away superabundant mucus and to carry astringent and healing drugs to the site of the lesion.

Duodenal lavage is indicated for ulcerative conditions in the intestine —to clean and stimulate necrotic areas, and may always be practiced before surgical measures are undertaken. The technic of lavage is discussed in Section I.

Attempts have been made to bring direct treatment to the seat of the lesion by coating the duodenal tube with protargol in agar and gelatin, or by injecting liquid albolene and bismuth through a duodenal tube *in situ*. The writer's experience warrants the statement that such procedures are irritating and of doubtful value.

Surgical Treatment of Peptic Ulcer.—Surgeons attempt to cure peptic ulcer by sidetracking the diseased portion of the intestine by performing gastro-enterostomy. While in some cases this seems to effect a cure, in others it leads only to further complications and distress. Another surgical procedure is *extirpation of the ulcer,* which, if curative, is certainly ideal.

Looking back at the results immediate and remote of all cases observed, my opinion is that surgical intervention should be reserved for those cases in which life is threatened by hemorrhage or perforation or in which, all other methods failing, the patient is left a chronic invalid and any, even the most radical methods, seem justified.

Ulcers in Other Parts of the Intestine

Simple ulceration in the intestines may result from a variety of causes, such as injury, enteritis, typhoid fever, from pressure of enteroliths or hard fecal matter, also from thrombosis or embolism in cardiac disease, in pyemia and cachexia. Ulceration due to tuberculous, luetic or malignant disease is discussed in Section V.

Symptoms.—The symptoms are diarrhea, colicky pain, bloody and tarry stools, pus and tissue shreds in stools. When perforation has taken place, symptoms of localized or diffuse peritonitis are in evidence. The proctoscope, sigmoidoscope and serial x-ray pictures are valuable aids for exact diagnosis.

Treatment.—The dietetic, hygienic and medicinal management is discussed under the headings, Diarrhea and Enteritis; enteroclysis with boiled or medicated water is a part of the routine treatment of such conditions. Suppositories of opium and belladonna and subcutaneous morphin injections relieve pain.

Duodenal lavage with two quarts of soap water or ichthyol water (3i to 2 qts.) is a direct curative procedure of some value. The Murphy drip, through a swallowed duodenal tube, suggests itself as a method of treatment.

Flushing the intestine from above downward by means of a fistulous opening surgically established, near the cecum or appendix, is an accepted procedure.

Indolent ulcers in the lower rectum may be stimulated by cauterizing with five per cent argentic nitrate solution.

Laparotomy with resection of the ulcerated portion of the gut is a

dernier ressort after other methods have failed and after the patient has had the benefit of six weeks of antiluetic treatment, in cases in which syphilis cannot be ruled out positively.

Derangements Due to Abnormalities of the Mechanism of the Gastro-Enteric Tract

Spasm of the Esophagus

Spasm of the esophagus may occur as a symptom of some general ailment, or it may be the expression of some localized disturbance. Uncomfortable deglutition is the principal objective symptom.

Atony of the Esophagus

Disturbances in swallowing may be present in neurotic and vagotonic individuals. Pain in the neck and chest and choking sensations and regurgitation are also complained of. When these symptoms are associated with inanition and loss of weight they simulate a malignant process.

A bismuth Röntgen ray examination will facilitate an exact diagnosis.

Treatment.—Hygienic and dietetic measures should be instituted and the treatment for Vagotonia adopted. (*See* Vagotonia.)

Cardiospasm

Cardiospasm is a functional spastic contraction of the cardia of shorter or longer duration, sometimes lasting for months and sometimes leading to hypertrophy and dilatation above the contraction. This phenomenon is in all probability the outcome of a hyperirritability of the vagus (vagotonia), the underlying causative factors being reflex irritation, infection, toxemia, etc.

Cardiospasm takes place at or near the cardiac orifice and may be followed by food retention with dilatation and hypertrophy of the esophagus wall. Patients so afflicted complain of a choking sensation and food regurgitation. By means of the stomach tube, larger quantities of food may be aspirated hours after it has been swallowed. This condition may last for years before emaciation takes place.

Treatment.—In mild cases bodily and mental rest must be secured. A soft diet is enjoined and bromids are given to reduce irritability. Atropin (gr. $\frac{1}{100}$ — $\frac{1}{50}$) 0,0006—0,001 twice a day is a most useful drug. If the spasms continue, soft bougies and rubber bag dilators should be passed. The patient may have to be fed through a stomach tube. Gastrostomy and vagolysis have been done in severe cases.

Diverticula

Diverticula are pouch-shaped sacculations involving a limited portion of the esophagus circumference. In such cases the patient is conscious of retained food in some portion of the esophagus.

Treatment.—If the symptoms are mild, severe measures are not indicated. The patient should be advised to eat slowly and avoid coarse food. In severe cases with dangerous inanition, surgical relief is feasible, wherever the diverticulum may be located.

Gastric Atony, Acute and Chronic Dilatation

In gastric atony the muscularis of the stomach is weak and the stomach cannot empty itself at the proper time. This lack of tonicity is not usually a strictly local condition, inasmuch as it frequently accompanies pronounced malnutrition and neurasthenia, and it does not as a rule necessitate local treatment.

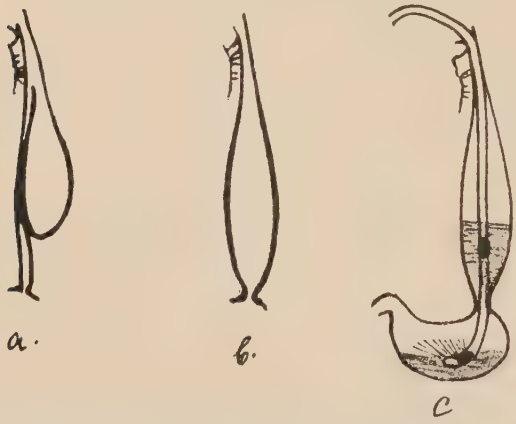


Fig. 105.—Diverticula of Esophagus (Schwalbe).

Prophylaxis and Treatment.—These run along the lines of hygienic living. Regarding diet, the same considerations apply as in chronic gastric catarrh.

As a cardiovascular tonic, hydrotherapy (*see* under heading Acute Gastric Derangements in the forepart of this section) is to be preferred to medication. Gastric lavage is a reliable stimulant of motor activity. The bowels should be made to move daily, preferably by means of abdominal massage, vibration and physical exercises and, if necessary, by means of laxative waters and medicaments. The percutaneous application of the faradic current is generally beneficial and also thermopenetration by means of the high frequency current. In the way of medication ten drops of a mixture of dilute hydrochloric acid and tincture of nux vomica—equal parts—may be given after each meal to aid digestion.

Pylorospasm

Pylorospasm in infants occurs in bottle-fed and breast-fed children. Food is retained in the stomach and vomiting with rapid emaciation is the clinical picture.

Treatment.—Pylorospasm not associated with organic pyloric obstruc-

tion responds to good management in the majority of cases. Lavage should be practiced daily until improvement is manifest. A change in *food and feeding intervals* may be necessary, and in this respect no general rules can be laid down. Massage of the abdomen, enemata, and an outdoor life are indicated in every case. Chloral hydrate 0,03 (gr. ½) and sodium bromid 0,12 (gr. ii) may be given by mouth in water three or four times a day. Tincture of iodin in one drop doses in cinnamon water will usually check vomiting. Pylorospasm in vagotonic subjects responds to atropia given in small doses. (*See* Vagotonia.)

Acute Dilatation of the Stomach

Postnarcotic paresis of the stomach with and without diet errors is observed after operations on the abdominal viscera and gives the clinical picture of shock.

Treatment.—The stomach tube should be used promptly, and the sufferer should be placed upon his right side or put into the knee elbow position. Permanent gastric syphonage is secured by keeping the stomach tube *in situ.* Placing the patient on his right side after an operation must be considered a *prophylactic measure* against acute dilatation. Stimulating measures, enteroclysis with saline solution at 115° F. and adrenalin solution—5 and 10 drops by hypo—should be employed.

Benign Pyloric Stricture

Benign pyloric stricture is observed in adults and children. Vomiting and stagnation are the salient features. In some cases a tumor is palpable in the pyloric region. In urgent doubtful cases an exploratory laparotomy must be done to be followed by dilatation, gastro-enterostomy or resection, according to the findings. In pyloric stenosis in infants division of muscular fibers, according to Rammsted, should be performed.

Chronic Dilatation of the Stomach

The salient feature of this condition is motor insufficiency and stagnation or pyloric obstruction and stagnation.

Treatment.—The treatment consists of gastric lavage, combined with hygienic, dietetic, medicinal and other management discussed above under Gastric Atony.

In *pyloric obstruction,* benign or malignant, the treatment is surgical after syphilis, as a possible factor, has been ruled out.

Hour-Glass Stomach

Hour-glass stomach is the term used to designate a central stenosis of this organ. The x-ray picture of this condition is characteristic.

Treatment.—If the constriction in the stomach is due to scar tissue following an ulcerative process, medication is useless. Surgical measures are indicated only in cases of marked malnutrition due to cicatricial stenosis.

Gastric Tetany

This symptom occasionally accompanies pyloric obstruction or pylorospasm.

Treatment.—Its therapeutic management is identical with that of the underlying condition.

Enterospasm

Enterospasm, or spastic constipation, may be acute or chronic. Pain and the ineffectual desire for bowel evacuation are the more pronounced features of this condition which is aggravated by the administration of laxatives. In the chronic form the feces are passed in small lumps, or ribbonlike stools are noticed.

Treatment.—Rest in bed must be secured and hot compresses should be worn over the abdomen. Colonic flushing with quarts of warm saline solution is to be employed daily. Atropia 0,0006 (gr. $\frac{1}{100}$) may be given by mouth or hypodermically. The following prescription is effective:

℞ Tinct. opii .....
Tinct. belladonna .....
Tinct. castorei .....
Tinct. valerian. ether.....
} āā 10,0 3iiss

S. For adults, 20 drops in hot sweetened peppermint tea, 3 times a day.

Chronic Constipation

This condition is discussed in the section on Minor Ailments.

Acute Intestinal Obstruction

(*Strangulation—Intussusception—Volvulus—Hernia*)

Symptoms.—Pain, vomiting, absolute constipation, localized bowel distention, passage of blood and streaked mucus are the pronounced symptoms. Occasionally a palpable tumor can be felt or an area of collapsed gut can be detected, adjoining a tympanitic distended bowel. In complete obstruction not even flatus is passed.

Treatment.—At the outset high clysmata of warm soap water or oil should be administered with the patient in Trendelenburg's posture. The bowel may be inflated by blowing in air by means of a Davidson syringe and a soft rectal tube. Medication such as is recommended for enterospasm may be employed.

In palpable visible *strangulated hernia* ether may be sprayed upon the

protruding part to be followed by gentle taxis. In all forms of intestinal obstruction laxative drugs are contra-indicated. All efforts to move the bowel should be applied at the lower end of the intestine and surgical measures should be resorted to promptly if other measures fail after a few hours' trial.

Chronic Intestinal Obstruction

Apart from benign and malignant new growths, an incomplete intestinal obstruction may result in any segment of the gut from kinks and adhesions and cicatrices from previous inflammatory process.

Treatment.—If an examination of the lower gut is negative and a suitable soft diet and daily enemata of warm soap water, massage, vibration and wet compresses worn over night will not improve matters to the extent that life may be fairly comfortable, a series of x-ray pictures following a bismuth meal will reveal the location and extent of obstructive factors, if present, and thus give a positive indication for surgical measures.

Fig. 106.—Method of Shaking the Hernial Contents Back into the Abdominal Cavity. (After Campbell-Kerr, "Surgical Diseases of Children.")

Gastroptosis—Visceroptosis—Enteroptosis—Splanchnoptosis

Asthenia universalis is a term coined by Spiller, in 1895, to designate persons of a nervous type with poor musculature and long thorax. Such individuals often show a mobile tenth rib and a neurasthenic disposition, with pronounced symptoms of so-called nervous dyspepsia. Inherited defects of this nature are, as the years go by, accentuated by faulty habits, constricting wearing apparel (corsets, waist bands) and by the wear and tear of pregnancy, etc.—all of which results in establishing the clinical picture of splanchnoptosis. A moderate degree of enteroptosis may also develop in persons debilitated by severe illness (acquired enteroptosis).

Prophylaxis and Treatment.—Children possessing the above outlined constitutional type should have the benefit of an outdoor life and good physical training, including deep breathing exercises, dancing, swimming.

Regular bowel action should be secured in every rational way and special efforts should be made to secure proper nourishment and its assimilation by hygienic living in the broadest sense.

Girls should not be permitted to wear rigid and constricting corsets or high heeled shoes. School benches should be constructed on scientific hygienic lines, so as not to encourage faulty postures, etc.

For overcoming the symptoms due to ptosis, an *abdominal bandage* or a *supporting corset* should be worn, which exerts a lifting pressure on the abdominal contents from below upwards and backwards and downward as well. Furthermore, hygienic living and food adjustment must be secured. A diet for "leanness" can be arranged (*see* Section I) which will furnish fat deposits needed to keep viscera in their place.

Finally it must be emphasized that splanchnoptosis is not a condition calling for surgical experimentation. Exceptional cases in which ptosis or malposition of an organ calls for surgical fixation are elsewhere discussed. The mechanical principles upon which a serviceable supporting belt or corset should be constructed are laid down by Miss D. Munson of New York City, as follows:

In any case where a supporting appliance is used to assist in the correction of a ptotic condition, the properly built corset will accomplish more than an abdominal support on account of the angle from which the "uplift" is accomplished. Reference to the mechanics of a derrick will make this clear. If there is "uplift" in the appliance, it must be so constructed that the pull reaches to the symphysis pubis. The garment not being attached to the bony structure, it becomes necessary to take another mechanical principle into consideration, namely, counteractory downward traction, which is secured by shaping the garment in *under the nates.* Care must also be used to allow enough freedom over the muscles to prevent the garment from being forced up on the body in the sitting position, for as soon as it is lifted so that the low line of greatest compression is above the symphysis pubis, the therapeutic purpose is defeated. Compression, as shown in the illustration, covers the lower one-third area of the abdomen, but gives perfect freedom over the diaphragm region.

In the majority of ptotic cases the patients have lost flesh, the abdomen is hollow so that no matter how tight a bandage is drawn over the crests of the ilium it does not touch the anterior wall of the abdomen. It is then necessary to use one or two of various special features in that part of the corset, according to the contour and nervous condition of the patient. One very effective feature is an inside compression belt made of elastic, because of its clinging nature, and if that is not sufficient a pad may be made to fit the abdominal concavity. This pad should be made of a light, non-heating substance which can be laundered and kept sanitary.

If the full benefit is to be derived in taking care of a splanchnoptosis with a supporting appliance the poise of the patient should be looked after very carefully by the appliance maker and corrected by the addition of any feature to the garment that may aid in this work, such as shoulder braces, etc.

The support for men with ptosis has a front lacing, but is easily handled, as the lacer is merely caught around hooks. This garment is boned throughout with flexible boning. The same idea of the high back is carried out, but soft

FIG. 107.—UPLIFT CORSET, FRONT VIEW.

FIG. 108.—UPLIFT CORSET; INCREASED COMPRESSION.

FIG. 109.—UPLIFT CORSET, SITTING POSITION.

knitted bands buckled about the legs give the counteractory downward traction.

It is not possible to fit all figures with the front lacing so that the garment will remain in place on the body, but a combination of front and back lacing will accomplish this result on the most of these figures. When the body development is too extreme it may be advisable to attach the corset to a band of knitted elastic fitted about the hips.

Women do not object to wearing these garments, for being designed on Nature's lines as they are, the "uplift" and compression being in imitation of muscles of the human body, they bring out the best and most harmonious lines of the woman's figure, and are really an improvement to the personal appearance, besides accomplishing a definite physical result.

Diseases of the Associated Glands of the Gastro-Intestinal Tract

Pancreatitis

(a) Acute Pancreatitis

Etiology.—Acute pancreatitis, hemorrhagic or suppurative, is due to infection arising from the biliary ducts or duodenum on the one hand, or carried to the pancreas by the lymph or blood stream on the other. It is favored by alcoholism, stone in the common duct and adhesions to diseased organs which pave the way for infection.

Clinical Forms.—These are the benign and fulminating types.

Symptoms.—Pain, vomiting and collapse are salient features of an acute attack of pancreatitis.

Treatment.—So long as the symptoms are not severe, relief may be obtained by retaining a hot-water bag over the epigastrium and giving a morphin injection over the seat of pain. When the symptoms which, by the way, resemble intestinal obstruction or perforating peritonitis, are severe, laparotomy should be performed for diagnostic purpose and subsequent surgical intervention for the purpose of establishing drainage. This prevents hemorrhagic and fat necrosis throughout the abdomen and supplies a means of escape for infectious material and necrotic sloughs. As the main digestive gland is out of commission, food must be given in an assimilable state. Supportive treatment is naturally of first importance during the critical period. Duodenal intubation and aspiration may aid in both the diagnosis and treatment of the condition. (See page 67.)

(b) Chronic Pancreatitis

Etiology.—Chronic pancreatitis is usually a sclerotic condition associated with biliary diseases or chronic alcoholism.

Symptoms.—It produces symptoms of enteric indigestion and more or less epigastric discomfort.

Treatment.—Removal of the exciting cause is of first importance and so may determine an operation for cholelithiasis which might not otherwise appear urgent. The diet must conform to the lowered digestive power of the pancreatic ferments and the use of gland extracts and of predigested food may be necessary. *Pilocarpin* in small doses has the power of stimulating pancreatic secretion unless the gland is very much changed. *Atropin* has a similar but less powerful effect. What effect the *iodids* can exert over the condition is problematical, and the same may be said for all the newer methods which are constantly being advocated for the relief of sclerotic conditions. There is one procedure which may have some effect, and that is the use of *cream of tartar* preparations to remove effete material. It may be given in lemonade. About a level teaspoonful should be taken with each glass and two or three such doses taken a day. Counter-irritation over the abdomen will remove some of the feeling of discomfort.

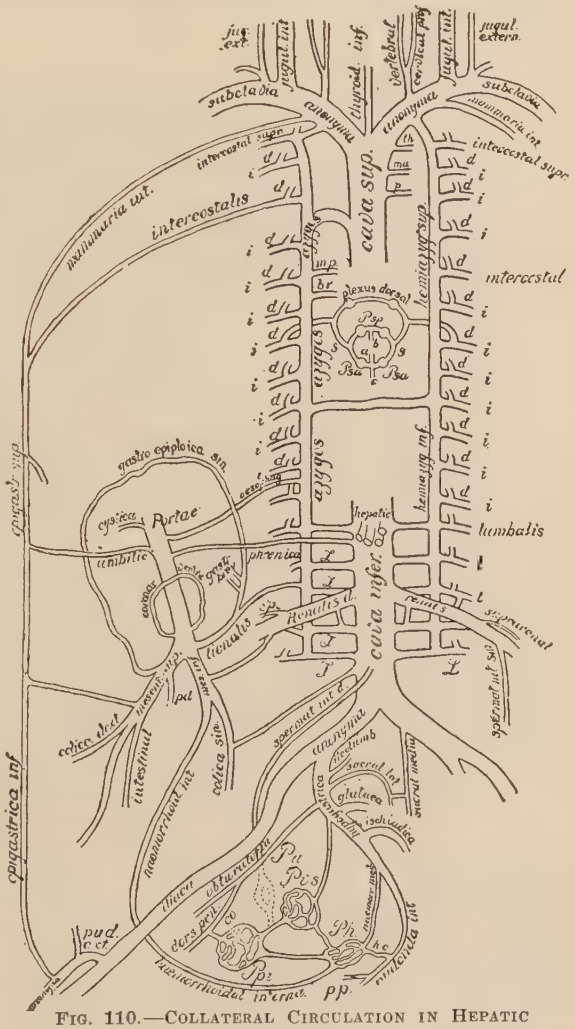


FIG. 110.—COLLATERAL CIRCULATION IN HEPATIC CIRRHOSIS.

Congestion of the Liver

Etiology.—Congestion of the liver is usually induced by gastric or intestinal indigestion and constipation. It may be due to organic diseases

of various kinds, which either mechanically impede the hepatic circulation or else reduce the general blood tension below the point where it can overcome the normal resistance found in the liver. As soon as the congestion occurs biliary secretion diminishes and liver function, especially that of purifying the blood from the portal circulation of its heavy charge of noxious material, ceases. A double source of danger therefore arises because with the withdrawal of this bile from the intestine undue putrefaction takes place and a train of symptoms due to intestinal toxemia is soon manifest.

Treatment.—Obviously the first thing to do is to sweep the intestinal tract free from offending material and to keep it clear until normal function reasserts itself. A thorough cleansing of the bowels can be accomplished by one single dose, as follows:

℞	Podophyllin	0,03	gr. ½
	Calomel	0,5	gr. vii
	Pulv. aromat.....	0,2	gr. iii

M. S. Take in wafer.

A restricted diet (2,000 calories) should be ordered for the patient and as long as the tongue remains coated 5 to 10 drops of diluted nitromuriatic acid should be given in water after each meal, and the patient should be told to exercise out of doors.

In passive congestion and dropsy from cardiac disease, digitalis treatment (digipuratum) should follow the initial purge.

Carlsbad salts in hot water every morning may be taken for a long time in hepatic congestive conditions or biliousness.

Cirrhosis of the Liver

Clinical Forms.—Cirrhosis of the liver occurs in two forms: the first represents more of a fatty degeneration and the second a marked connective tissue proliferation. This latter has two subdivisions according to whether the chief connective tissue growth occurs about the lobules or within them. All of the types obstruct the portal and hepatic circulation and the intralobular types also close off more or less extensively the radicles of the biliary duct, thereby inducing a retention of bile and secondarily producing jaundice.

Prophylaxis.—Hygienic living is the only preventive measure against hepatic insufficiency and cirrhosis.

Treatment.—All that can be done for advanced cases is to relieve the liver of as much work as possible by imposing a bland easily digested diet on the patient, relieving the secondary catarrh of the stomach and intestines due to the portal congestion, stimulating the liver to act as far as it is able

by exercise and by an occasional dose of podophyllin and calomel. (*See* Hepatic Congestion.)

Cirrhosis of the liver developing in a luetic subject can be favorably influenced by a course of iodid of potassium, and therefore this viewpoint should not be overlooked.

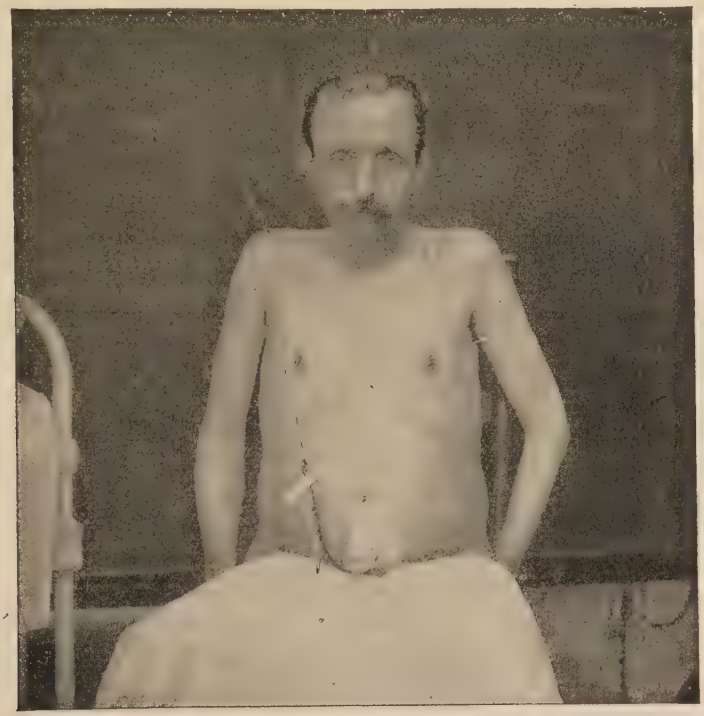


FIG. 111.—PERMANENT DRAINAGE FOR ASCITES (Author's Method).

Rectal irrigations with cold water are said markedly to reduce portal congestion and jaundice. Lately duodenal irrigations have been employed, and very favorable results have been reported. Attempts have been made to circumvent hepatic obstruction to the circulation by grafting a piece of omentum between the liver and abdominal wall with the idea of establishing a collateral circulation; but up to the present time the results, while not absolutely negative, have not been very gratifying. When *ascites* occurs and produces burdensome symptoms, withdrawal of the fluid or permanent drainage is indicated. (*See* Bedside and Office Technic.)

Cholecystitis and Gall-Stones

Cholecystitis and gall-stones are such closely allied subjects that they will be considered together. Some local condition of nutrition or congestion lowers the resistance of the mucosa of the gall-bladder and infection

gains lodgment, producing a more or less severe inflammation. The bacteria may reach the organ by the blood or lymph stream or ascend from the duodenum. This latter condition is especially likely to occur if the Bacillus coli inhabits the upper part of the intestinal tract. The infection may be severe enough to cause an empyema of the gall-bladder—in which event surgical intervention becomes immediately necessary. On the other hand, an equally urgent state may arise from a septic thrombosis of the vessels and a resulting gangrene.

Inflammation of the gall-bladder may terminate in resolution. Pain and swelling subside after a few days or after several weeks.

Treatment.—The palliative treatment consists in rest in bed, a brisk purge, ice or hot water to the region of the gall-bladder and morphin subcutaneously. The usual outcome, however, is the production of gall-stones through a deposition of cholesterin and lime salts, and it is now generally believed and accepted that certain individuals are burdened with cholesterinemia or a *cholesterin diathesis,* and after the first infection of the gall-bladder conditions are favorable for gall-stone formation.

As long as *gall-stones* remain in the gall-bladder they may occasion no severe symptoms, but the moment they pass into the cystic duct severe pain and colic, prostration and reflex vomiting are usually manifested. If the stone passes on into the common duct it may be discharged into the intestine with relief of the condition, and without giving rise to jaundice. On the other hand the gall-stone may become impacted and produce marked jaundice, which sometimes is intermittent, when the obstruction is only partial, or it may perforate into the abdominal cavity causing peritonitis, or into some part of the alimentary tract, producing a fistulous communication.

The treatment during the attack is the subcutaneous administration of morphin and atropin, rest and hot applications. After the attack has passed and to prevent recurrence, various oily cathartic and antiseptic preparations, such as olive oil, mineral oil, or chologestin, may be employed.

The administration of Bacillus bulgaricus, suspended in mineral oil and sold under the name of *cultol* may be tried with a view of preventing recurrences. Vibratory massage has been practiced over the region of the gall-bladder with the hope of aiding nature in the elimination and transfer of very small stones through the natural outlet of the viscus. If the gall-bladder remains tender and recurrences are frequent and the patient is not yet cachectic, an operative procedure is indicated after duodenal intubation and other means failed to improve the condition present.

Abscess of the Liver and Suppurative Pylephlebitis

Etiology.—Hepatic abscess is always due to infection, but traumatism may be a direct incitive factor. The various *pathological factors* which give rise to abscess formation in the liver may be grouped as follows: infection by means of foreign bodies (needle, fishbone, gall-stones); in-

fection by means of parasites (echinococcus, round worms, ameba, actinomycosis, etc.); infection by means of pyemic embolism, such as suppurative pylephlebitis, typhoid ulcer, ulcer in dysentery, tropical abscess, appendicular ulcer, pelvic suppuration, gangrene of the intestine, puerperal sepsis, gall-bladder suppuration, etc.

The infecting agent may reach the liver by way of the portal vein or hepatic artery. The abscess may be solitary or multiple. The so-called "tropical liver abscess" occurs most frequently in the hot countries. Sporadic cases of tropical liver abscess are encountered as exotic manifestations in the temperate zones. Hepatic abscess is at times the result of trauma; usually, however, the result of invasion of the hepatic tissue by various forms of parasites, protozoa, and pyogenic organisms.

Symptoms.—The cardinal symptoms are irregular fever, chills, and septic phenomena, sweats, enlargement of the liver, hepatic and right shoulder pain, moderate jaundice, a sallow complexion, and gall-stone disturbances. *In doubtful cases aspiration of the liver is indicated.*

Diagnosis.—In *malarial fever* the plasmodium is found in the blood; and the administration of quinin brings improvement and cure. In *typhoid fever* we observe roseola and frequently a positive Widal reaction. Hepatic abscess may complicate typhoid fever.

A *right-sided pyothorax* may result from hepatic abscess breaking through the diaphragm into the pleural cavity. The aspirated pus in such cases is brownish in color and liver cells may be found with the aid of the microscope. *Rapid cardiac failure* with congestion of the liver and excruciating pain has been mistaken for hepatic abscess.

Prognosis.—The prognosis is grave.

Treatment.—*Surgical.*—When adhesions have formed between the liver and the abdominal wall and the abscess points, simple incision and drainage are indicated. When this is not the case, operative interference involves the opening of the abdominal cavity in order to have access to the liver. The single large abscesses offer the best chance for an operation. Pyemic abscesses and suppurative pylephlebitis are generally fatal.

The *non-surgical management* is that of septicemia.

Acute Yellow Atrophy of the Liver

(Malignant Jaundice)

Etiology.—This is a rare but fatal disease which may be defined as an acute infection of the liver in which there is a rapid disintegration of the liver cells accompanied by great reduction in the size of the organ, with deep jaundice and grave nervous symptoms. The condition is similar to that produced by phosphorus poisoning.

Symptoms.—The *principal symptoms,* extending over two to four weeks, are jaundice, vomiting, delirium, hemorrhages and rapid atrophy

of the liver. Leucin, tyrosin, bile, and albumin are found in the urine.

Treatment.—In the way of treatment nothing can be done beyond cleansing the alimentary tract and stimulating the patient.

Hydatid Cysts of the Liver

(*Echinococcus*)

The cyst is formed by the larvae of tenia, is unilocular or multilocular, and gives no marked symptoms in its incipient stage. A large cyst may present as a fluctuating swelling. If situated to the left of the suspensory ligament, pressure on the heart may result. The cysts may perforate any neighboring hollow organ. When suppuration in the cyst takes place, pyemic symptoms supervene. The hydatid fremitus is a diagnostic sign in echinococcus cysts. In simple cysts the general health may be good. When hydatid cysts rupture or are punctured, urticaria often develops from absorption of irritating fluid.

Diagnosis.—In order to distinguish between hepatic abscess, carcinoma, and hydatid cyst, a puncture is necessary. Multilocular cysts and carcinoma cannot be distinguished without puncture. Dilatation of the gall-bladder and hydronephrosis have been mistaken for echinococcus cysts. An examination of the puncture fluid will reveal the condition present. Hydatid cysts have been mistaken for right-sided pleurisy. The puncture fluid of echinococcus shows albumin and free fluid containing hooklets. Sterile cysts contain no hooklets, and cysts which have been irritated may show albumin in the fluid.

Treatment.—Medication and injections into the cyst are useless. When simple aspiration fails to cure, incision is indicated.

Chronic Degenerative Processes in the Liver

The conditions to be briefly described under this heading have more of a pathological than clinical interest, inasmuch as they represent pathological incidents in the course of various systemic diseases.

Atrophy of the Liver may result from all forms of cachexia or marasmus. The liver is small.

Fatty Degeneration is observed in poisoning by phosphorus and in acute infections. The liver is small.

Fatty Infiltration is often associated with general obesity and severe anemia. It is quite common in children in gastro-enteric and other acute infections. The liver is enlarged.

Amyloid Liver is observed in the cachexia of chronic suppuration, chronic malarial disease, chronic gout, syphilis, leukemia, and pseudo-leukemia. The liver is enlarged.

In all these conditions a consideration of the underlying cause leads to the diagnosis, gives the prognosis, and indicates the treatment.

Syphilis of the Liver.—In congenital syphilis of the liver we observe diffuse infiltration, gummata, and chronic induration (syphilis hereditaria tarda). In acquired syphilis, the diffuse infiltration and gummata are present.

Treatment.—The treatment is antisyphilitic and sustaining. (*See* Section V.)

Floating Liver.—A displaced, prolapsed or floating liver is one of the very rare features of splanchnoptosis. A supporting bandage or corset should be worn in such cases.

Jaundice as a Symptom

Jaundice may manifest itself in disease of the liver and in various other conditions in which the free flow of bile into the small intestine is interfered with. When the flow of bile is obstructed, and its production by the liver parenchyma continues, we have an overfilling of the gall-bladder and a resorption of bile by the lymphatics into the general circulation, as shown by the icteric pigmentation of the tissues from light yellow to brown or green. The urine, the sweat, and inflammatory exudates show this coloration. The tears, saliva, and gastric juice do not as a rule appear yellow. The cholates of the bile also get into the circulation and act as systemic poisons. Jaundice is not dependent upon complete obstruction of the large bile duct, and any localized obstruction in the liver may be associated with jaundice. In gall-stone colic with incomplete obstruction jaundice is often absent.

The symptomatic jaundice in infectious septic conditions and in certain intoxications (phosphorus) is probably due to fatty degeneration of the liver cells, in which condition absorption may take place without obstruction.

That bile pigments can be formed without direct liver activity is established. Owing to changes which take place in blood extravasation we know that bilirubin may form from hemoglobin.

Whenever bile fails to get into the intestine, nutrition is markedly interfered with, and when bile enters the circulation the cholates act as nerve poisons, blood pressure is diminished, the heart becomes slow and irregular in action, and coma may set in (cholemia). A thick, tenacious bile is more readily absorbed than a thin bile. Cholemic symptoms depend upon the concentration of the poison in the blood, so that we may observe intense jaundice without much constitutional disturbance. On the other hand, coma, convulsions, delirium, fever, etc., are observed in icterus gravis as well as in hepatic disease with little or no jaundice.

Symptoms Associated with Jaundice.—In jaundice of long standing,

we notice a tendency to hemorrhage from the mucous membranes (acquired hemorrhagic diathesis), and we find the urine to contain albumin and hyaline casts in addition to bile. The skin, mucosa, and conjunctiva turn yellow, brown, or green. The skin becomes blotchy, and itches. The stools are clay colored, pasty, and fetid. The heart's action is slow, notwithstanding a moderate rise of temperature, and the pulse may be intermittent. The patient is irritable, depressed, delirious, or comatose (typhoid state) and may have convulsive seizures.

Clinical Forms of Jaundice

The clinical forms of jaundice are *jaundice* of the *newborn,* mild and septic, *mild catarrhal jaundice,* at all ages, *icterus gravis* of hepatic origin (acute, chronic, infectious, and obstructive), *infectious jaundice,* and *toxic jaundice.*

Jaundice with Reference to Its Origin

Obstructive Jaundice	Gastroduodenal catarrh, catarrh of the bile ducts, gall-stones or worms in the bile duct, pressure on the duct by tumors of any neighboring organ or fecal accumulation or aneurism, cicatricial stenosis of the bile duct, pressure of the gravid uterus.
Hepatic Jaundice	Acute and chronic hepatitis, syphilis, malaria, cirrhosis, etc., acute yellow atrophy.
Toxemic Jaundice	Microbial toxins (infectious disease), epidemic jaundice, jaundice following vaccination, influenza, typhoid fever, and other infections, also tonsillar infection, chemical poisons, snake venom.

Prognosis of Jaundice

The prognosis in jaundice cases depends upon the underlying cause. The mild catarrhal form in children and adults terminates favorably in from one to six weeks. In the newborn, the mild form lasts from a few days to three weeks. Severe infectious jaundice in the newborn is usually fatal.

The infectious, or toxic, jaundice in older children may last three to four months, particularly if occurring in subjects with *fatty liver,* and may end in recovery or death. In severe obstructive forms recovery depends upon our ability to remove the cause. In jaundice of long standing an exploratory laparotomy is indicated with the hope of finding and removing an obstruction (gall-stones, stricture).

Treatment of Ordinary Cases of Catarrhal Jaundice

In the case of infants a soapsuds enema should be given once or twice a day with a four ounce piston syringe to which is attached a soft rubber

rectal tube. A teaspoonful of Vichy water may be administered several times a day.

Catarrhal Jaundice in Older Children and Adults

Treatment.—In mild, non-febrile cases the patients may be treated out of bed. Febrile and severe cases should rest in bed.

Diet.—The diet should consist of milk, meat, eggs, cereals and other soft diet, stewed fruit, pineapple or orange juice, beef jelly, wine, tea, tropon in peppermint tea.

Usually there is a loathing of food and the appetite must be tempted by offering palatable food. In severe indigestion supplementary feeding per rectum is indicated.

Medication.—From 2 to 10 grains (0,12-0,6) of calomel should be given at once, followed by a saline cathartic. Carlsbad salt or sodium phosphate may be employed frequently to keep the bowels open. To aid digestion 5 drops of dilute muriatic acid are to be taken in water after eating. The so-called cholagogues are probably useless; on the other hand large quantities of water by mouth and per rectum and by means of gastric and duodenal lavage are of great value in jaundice. In protracted cases in which syphilis or malaria is suspected as an underlying cause, quinin or Warburg's tincture should be given by mouth, or potassium iodid dissolved in water per rectum.

Abdominal massage and vibration may be practiced and the patient may remain in a covered bath at 105° F. for an hour each day with the object of eliminating systemic poisons through the skin.

Itching is controlled by powdering with starch or sponging with a warm soda solution.

Furuncles and cold abscesses should be opened as soon as pus has formed.

Conditions Not Elsewhere Considered

Noma

Noma is a condition of gangrene which starts in the mouth in poorly nourished children and most frequently follows measles, diphtheria, scarlet fever, etc. Noma is apt to terminate fatally from general sepsis unless well directed treatment is applied early.

Prophylaxis.—Prophylaxis consists in keeping the mouth clean at all times, but especially during the febrile stage of acute infectious diseases and of preventing injury to the gums and oral mucous membranes generally.

Treatment.—Constitutional treatment comprises all measures calculated to raise the resistance and general vitality of the patient. Sera of

various sorts have been tried but without much success. Several doses of diphtheria antitoxin (3,000 to 5,000 units) should be injected in all cases that do not respond favorably to mouth washes of boroformalin or potassium permanganate. Necrotic areas should be touched up with peroxid of hydrogen or with 5 per cent argentic nitrate solution or thoroughly destroyed with the actual cautery.

Appendicitis

General Considerations and Treatment.—Appendicitis is distinctly a surgical condition, whether occurring as an apparently mild attack or as an acute fulminating process. Operative dangers have been reduced to such an extent that, where modern methods and equipment are available, the risk is almost negligible. Owing to the rudimentary state of the organ, its poor drainage, large amount of lymphoid tissue and terminal blood supply, pathological changes are almost always progressive.

One attack predisposes to another, usually a more severe one. As it is impossible to say how severe an attack may become, the only safe procedure is speedy removal of the diseased appendix. In those cases where thirty-six or forty-eight hours have already elapsed before the case is seen and where there is a commencing retrogression of the symptoms, it may be well to wait until the attack has subsided and an interval operation can be done.

Pain and temperature are very uncertain signs to go by in judging a case and most reliance should be placed on the rate of the pulse, the blood count, the amount of rigidity or distention, the vomiting and the appreciation of a tumor mass in the proper location. Certain complications in individual cases may make operation more than usually hazardous and, where the outlook seems favorable, palliative treatment may seem wisest.

The question of moving the bowels is a disputed one. In a case where there has been an evacuation within twenty-four hours and no great accumulation of fecal matter is evident, or where a perforation exists, the bowels should not be disturbed. Where a long period of constipation has existed, and especially if operative interference is not contemplated, the bowel should be gently emptied by introducing about 250 c.c. of warm olive oil, and have this retained in the rectum for one-half hour. This softens the hard head of the advancing fecal mass, whereupon soapsuds enemas may be employed, about 500 c.c. at a time, until it is apparent that the major portion of the feces and gas has been removed from the large bowel.

When on the occasion of a first attack of appendicitis the diagnosis has been established and an immediate operation does not seem warranted, opium or morphin should be given to subdue pain. The dose must vary with the age and condition of the patient and must be repeated when its effects have worn off. In adults an initial dose of 10 to 15 drops of

tincture of opium may be given by mouth or ¼ to ½ grain (0,015-0,03) of morphin hypodermically, over the seat of pain. Thereafter smaller doses are to be administered, usually by mouth, and enough should be given to make the patient fairly comfortable without narcotizing him. Children should receive ⅛ or $\frac{1}{10}$ of the dose given to adults.

Two ice bags should be placed over the abdomen, saddle-bag fashion. Hot-water bags may be applied instead of ice bags if the patient is manifestly uncomfortable under the latter.

For the first twenty-four hours warm and sweetened peppermint tea and cool water may be given freely to the exclusion of all other nourishment. On the second day, broths, gruel, ice cream, water ices may be taken, and gradually other articles of food selected from the list of liquid and soft diet are allowed. If the case progresses favorably a small enema of oil and soap water can be administered on the third or fourth day of illness, and this should be repeated daily, provided it gives no pain, until the patient is out of bed.

On the second day of illness dilute hydrochloric acid (20 drops to a wineglass of water) may be left where the patient can sip it, oft and on. This seems to remove many of the subjective symptoms, especially nausea and belching which are often very distressing.

Almost all cases of appendicitis are associated with irritation of the caput coli and ascending colon, which accounts for the vague sense of distress so frequently complained of in the convalescing period. Regulation of the diet and bowels forms the chief method of combating this condition.

If, during this conservative management of a mild first attack of appendicitis, severe symptoms set in, operative interference is indicated. In the event of an uninterrupted recovery an interval operation should be advised.

A severe attack of appendicitis manifests itself by the intensity and persistence of the pain, the rapid pulse, the degree of muscular rigidity and the facial expression of the patient. Immediate operation is indicated in such cases provided an experienced surgeon is available. If not, it is best to carry out the treatment outlined above.

Appendicitis in typhoid fever should, as a rule, not be operated upon unless there is a perforation.

Appendicitis during pregnancy should be operated upon if the diagnosis is positive. When the diagnosis is doubtful, treatment should be on conservative lines.

Chronic Appendicitis and Reflex Phenomena

Reflex phenomena such as pain, nausea, vomiting, gas belching, headache, mucous colic and a host of neurasthenic manifestations, have their

origin in various underlying pathological conditions such as peptic ulcer, gall-stones, floating kidney, chronic appendicitis, etc.

The diagnosis of chronic appendicitis is not arrived at by a process of exclusion nor is it the outcome of a deductive scrutiny of reflex symptoms. It is made directly by the palpating finger tips inasmuch as a tender and indurated appendix can be palpated in most people.

Treatment.—Once the diagnosis is made, the treatment is surgical. It is practically an interval operation with very little risk. In the writer's experience some cases of chronic appendicular trouble make a spontaneous recovery, especially if the bowels are kept open and vibratory massage is applied over the appendix region three times a week for some length of time. Another class of cases runs a chronic course without a single acute "flareup."

No one can foresee how a case will terminate as long as a diseased appendix remains *in situ.*

Peritonitis

For tuberculous and malignant peritonitis *see* Section V.

Acute Peritonitis

Acute peritonitis is usually secondary by extension or perforation, or has its origin in puerperal infection, etc. Peritonitis may be localized or diffuse.

Symptoms.—The classical symptoms are pain, abdominal distention, rapid pulse, vomiting—fever is not always present. On examination the abdomen is found motionless and rigid and on auscultation the gurgling of peristaltic unrest can be distinctly heard.

Prophylaxis.—Prevention of puerperal infection, timely treatment of diseases of the uterus and adnexa or of gastro-intestinal ulcer, of gall-bladder infection, of liver abscess, of intestinal obstruction and subphrenic or perinephritic abscess, etc., are prophylactic measures of great importance.

Treatment.—In localized peritonitis the question of immediate operation must be decided in each and every case upon its merits. If the original site of the trouble is known and accessible, it may be good policy to attempt to reach and drain the septic focus and thus prevent a general conflagration. On the other hand, in *localized pelvic peritonitis,* early operation is not always the best treatment in cases in which the septic focus cannot be reached from below. If a decision against immediate operation be reached the dietetic and pain-relieving management is practically the same as in acute appendicitis: absolute rest, ice bag, opium or morphin and very little liquid food in the beginning and only enough water or cold

tea to quench the thirst. Enteroclysis and the Murphy drip should supply most of the water needed.

Vomiting is a prominent symptom in peritoneal irritation. If it cannot be controlled by a few drops of tincture of iodin in sweetened peppermint tea or by small doses of morphin, lavage of the stomach is indicated. When feeding by mouth is far below caloric requirements, supplementary feeding per rectum must be established. (*See* Bedside and Office Technic, Section I.)

Diffuse General Peritonitis

Diffuse general peritonitis is usually a preventable condition. Prophylaxis consists in early recognition of conditions liable to end in peritonitis and prompt energetic treatment of such predisposing conditions.

Treatment.—The treatment is surgical with limitations. Here, as in the localized form, the question of immediate operation is paramount. The contra-indications for surgical interference are cachexia from chronic nephritis, diabetes and cancer. If several days have gone by and the patient's condition is bad, operative therapy is liable to hasten the end.

If, after due consideration, so-called medical treatment is decided upon, we proceed as in acute appendicitis or localized peritonitis with our main reliance upon opium or morphin in sufficiently large doses to subdue the pain. During the first few days a restricted liquid diet is given and subsequently liquid and soft diet is permissible. If vomiting persists it is best to give nothing by mouth and to administer by the Murphy drip a warm saline solution holding 5 per cent dextrose.

Constipation and *meteorism* may require small clysmata of soap water and the passage of a soft rectal tube to give vent to gas. A single injection of pituitary controls meteorism very effectively. It should not be used in typhoid fever, however. In peritonitis which does not involve the intestine, sodium sulphate in laxative doses can be given by mouth.

Toxemia with circulatory and respiratory failure necessitate early stimulation by means of camphor, caffein sodium benzoate, whisky with fluidextract of digitalis, also saline hypodermoclysis.

High temperatures are controlled by sponging with cool water and not by drug administration.

Hirschsprung's Disease

Constipation in the newborn due to dilatation and hypertrophy of the colon has received the name of the author who first contributed to our knowledge of this condition by a monograph published in 1888. Colon dilatation has been divided into three groups:

1. True congenital megacolon.
2. Hypertrophy and dilatation due to abnormal length and motion of sigmoid flexure.

3. Colon hypertrophy and dilatation due to spasm of sphincter.

Symptoms.—The two cardinal symptoms of this disease are severe constipation and extensive dilatation of the abdomen. These two symptoms often appear at birth or at other times—not until weaning or toward the end of the first year of life. One can easily feel dilated masses of gut, especially if the abdominal walls are thin. Visible peristalsis is a very common sign. On percussion tympany is usually heard all over the abdomen. Often tumor masses of feces can be made out. Vomiting is a rare symptom.

FIG. 112.—CONGENITAL IDIOPATHIC DILATATION OF THE COLON (HIRSCHSPRUNG'S DISEASE). (After Campbell-Kerr, "Diseases of Children.")

Treatment.—The treatment is at first medical and eventually surgical.

Daily enemata, faradization and strychnia are occasionally helpful in this condition.

If spasm is present opium and belladonna are indicated.

Resection of the colon in two sittings seems to be the best surgical procedure. The mortality in 358 cases thus far reported is about 40 per cent and slightly lower in cases treated surgically.

Section VIII

Ailments Localized in the Respiratory Tract

For Syphilis, Tuberculosis and Carcinosis of Respiratory Organs *see* Section V.

General Remarks on Prophylaxis and Treatment

From a clinical standpoint, we find that, apart from *malformations* and *injuries,* the various disturbances of the respiratory organs take their origin in *transitory congestive conditions* and in *infection.* We encounter *obstructive phenomena* due to foreign bodies, swellings, pseudomembranes, tumors, and we frequently encounter *hemorrhage* and neurotic manifestations. The life of the cell and that of the organism depends upon the absorption of oxygen and the elimination of carbon dioxid. This gas exchange we call, in a broad sense, respiration. *External respiration* takes place in the lung, *internal respiration* takes place in the various other tissues.

As a prime condition of life, pure air must have free access to the lung, and Nature attempts to expell foreign elements in the respiratory tract by the coughing effort, and by means of a centrifugal propulsive power of the ciliated epithelia of the trachea and bronchi.

The natural secretion of the mucous lining of the respiratory tract also aids in the expelling process as to the sense of smell and the act of sneezing and coughing.

The respiratory tract is the portal of entrance for many infectious diseases, and as most respiratory infectious ailments are contact infections, we may avoid them by keeping out of the environment of the sick and by keeping the nasopharynx in a normal condition. In the management of a disease of the bronchi or lungs in which cough is a prominent symptom, we must at all times bear in mind that cough is a conservative effort, and need not necessarily be suppressed by sedative medication, because a weak cough in young infants and feeble, aged people favors an undue accumulation of secretion in the lungs, with corresponding great danger to life. Inactivity of the respiratory function as well as inactivity of the gastrointestinal tract means stagnation and danger.

On the other hand an incessant and fruitless cough is also a danger, harassing the patient, destroying the elasticity of the lung tissue and producing undue arterial pressure. In such cases sedatives are in place.

Mouth breathing, in consequence of nasopharyngeal obstruction in infants and children, interferes with the sucking power and with nutrition, and the removal of such obstruction may prevent severe constitutional derangements.

Prompt and energetic antitoxin treatment for nasopharyngeal diphtheria not alone overcomes local inflammation and sepsis, but it *prevents* at the same time an extension of the pseudomembranous exudate to deeper parts (croup). Hay fever subjects may avoid a vasomotor swelling of the nasal membranes by a timely change of environment and proper attention to local abnormal conditions in the nasopharynx. In anemic, chlorotic and neurasthenic subjects, nose and throat symptoms are not as a rule remedied by local treatment alone.

Tissue respiration or internal respiration is the exchange of gases between the blood and the tissues. In anemic persons the oxygen of the blood is diminished and we notice a marked dyspnea on exertion. A primary disturbance of internal or cell respiration may take place in consequence of changes in the parenchyma of cells or may be due to toxic substances, contained in the circulating fluids. The medulla is extremely sensitive to faulty metabolism (suboxidation and toxemia) and certain forms of air hunger cannot be overcome without proper attention to these causative factors. Respiratory disturbance is accompanied by a disagreeable sensation, called *dyspnea*. Sufferers from chronic dyspnea eventually reach a certain stage or degree of tolerance, particularly during muscular rest. Active dyspnea brings about a strain on the heart and heart inefficiency is always accompanied by dyspnea.

Cough is a reflex phenomenon transmitted through the vagus nerve. The act of coughing is composed of a deep inspiration and expulsive expiration with a momentarily closed glottis. Bronchitis may terminate as pneumonia if in the act of coughing septic material from the bronchi is forced into the air cells of the lung, and thus a city dweller afflicted with bronchitis may avoid the more serious ailment by a change of environment to dust-free, pure air, for fresh air is the foe of pneumonia.

Résumé of Prophylactic Measures Against Respiratory Ailments

Living-room temperatures—60° to 70° F. Windows open at night, top and bottom.

Light-weight woolen underwear in winter. Heavy outergarments for out-of-doors.

Regular bowel action.

Daily physical exercises. Daily baths. Cold sponge baths. Deep breathing exercises in dust-free air.

Damp cheesecloth over nose and mouth when working in dust.
Avoidance of automobiling over dusty roads.
Avoidance of crowded places when in a run-down condition.
No close contact with persons who cough and sneeze.
No exposure to direct drafts.
Removal of adenoids and hypertropnic diseased tonsils.
Removal of carious teeth and nasal obstruction.
Temporary or permanent change of climate.

Résumé of Therapeutic Measures in Respiratory Ailments

Mild exercises in dust-free air for afebrile cases.
Rest in bed for febrile cases.
Warm baths, footbaths, sponge baths, steam baths.
Nasopharyngeal toilet with salt water, to be followed by spraying with benzoinated albolene.
Free bowel action.
Dilute hydrochloric acid to aid digestion.
No routine cough mixtures, as a rule.
Inhalation therapy.
Light diet.
Temporary or permanent change of climate.

Ailments of the Nose

Acute Rhinitis

For acute rhinitis *see* Minor Ailments.

Rhinitis chronica hypertrophica

(*Chronic Nasal Catarrh*)

Definition and Etiology.—A chronic inflammation affecting the mucous membrane of the nose, accompanied by a thickening or swelling in the tissues. Among the more common causes may be mentioned the presence of spurs or deviations of the septum, working or living in dusty atmosphere, frequent attacks of acute rhinitis and rheumatic or gouty diathesis.

Treatment.—The indications for treatment are the reduction of the inflammation and restoration of the breathing space. Cleansing sprays are the first to be resorted to. The spray should be slightly alkaline and contain sodium chlorid of about the strength of a normal saline solution. The following is a good formula:

℞	Sodii bicarbonatis	gr. vi	0,4
	Sodii chloridi	gr. iii	0,2
	Aquae	℥i	30,0

Sig. Use as spray.

After the parts are thoroughly cleansed, a fine spray of the following should be used as an antiseptic, sedative, anesthetic and protective:

℞	Menthol	gr. viii	0,5
	Camphor	gr. v	0,3
	Eucalyptol	min. xv	1,0
	Albolene .....ad fl.	℥i	30,0

After the condition improves a spray of ferric alum (1 per cent) may be applied. Where these applications, after thorough trial, do not seem to relieve the swelling, the treatment becomes largely surgical. The prime surgical indication is the removal of the hypertrophied tissue by a snare or galvanocautery or drill.

Rhinitis chronica atrophica

(*Chronic Atrophic Rhinitis*)

Definition and Etiology.—A chronic inflammation involving the mucous membrane of the nose, and resulting in atrophy of the tissues, glands and turbinal bones. It is probably the result of the action of specific bacteria, and may accompany suppurative processes involving the accessory sinuses of the nose, and it may be one of the manifestations of inherited or acquired syphilis.

Treatment.—The first indication in the treatment is to thoroughly cleanse the nose in order to remove the inspissated secretion, which is more or less decomposed, and thus prevent as far as possible the re-formation of the crusts.

For this purpose a pint douche bottle should be employed with a proper nozzle and the nose thoroughly cleansed with an alkaline wash, such as a warm Dobell's solution or the following soda salt solution. This is prepared by filling the pint bottle three-quarters full of luke-warm water to which is added two-thirds of a teaspoonful of a soda salt mixture (sodium bicarbonate two parts; sodium chlorid, one part). In douching the nose the bottle should not be elevated too much. At first the nasal cavity should be washed three times a day, and then at longer intervals.

If the odor is exceedingly foul and not allayed by thorough washing with the above solution, potassium permanganate may be used in a weak solution (grains two to one pint of luke-warm water). Two or three times

a week the entire mucous membrane of the nose, after thoroughly cleansing, should be swabbed with the following solution:

℞	Iodini	gr. x	0,6
	Potassii iodidi	gr. xx	1,3
	Glycerini	ʒi	30,0

After the crust formation has been fairly well controlled, it is advantageous to swab the nasal mucosa once a week with the following:

℞	Acidi carbolici	ʒi	4,0
	Glycerini	ʒvii	28,0

In every instance the patient should be carefully studied as to his general condition, and besides administering tonics—iron, arsenic—the internal administration of iodid of potassium has been found very efficacious as a stimulant to the mucous membrane.

Rhinitis membranacea (*non diphtheritic*)

Definition and Etiology.—An acute inflammation of the mucous membrane accompanied by the formation of a pseudomembrane. The disease occurs more frequently in children who are poorly nourished and live amid damp and unhygienic surroundings. It occasionally follows as a result of some traumatism to the mucous membrane.

Treatment.—The nose should be carefully syringed, three to four times a day with a non-irritative fluid, such as described under Hypertrophic Rhinitis. Should the membrane produce a nasal obstruction so marked as to prevent the child from nursing, it may be removed by forceps with as little violence as possible. In doubtful cases 2,000 units of diphtheria antitoxin should be administered.

Rhinitis purulenta

Definition and Etiology.—An inflammation of the mucous membrane of the nose accompanied by the discharge of pus. It generally occurs in infants, soon after birth, whose mucosa has been infected by the vaginal secretions—especially gonorrhea.

Treatment.—The nose should be kept clean by syringing with a normal saline solution from three to four times a day. Particular care should be taken that the child is properly nourished.

Vasomotor Rhinitis

(*Hay Fever—Pollen Fever*)

Definition and Etiology.—A condition of intense engorgement of the nasal mucous membrane, with paroxysmal sneezing, suffusion of the eyes, and a watery discharge from the nose.

The best observers recognize three factors necessary for the production of this disease: (1) a neurotic individual; (2) special susceptibility, and a very irritable condition of the nerve ends in the mucous membrane of the nose and in the conjunctiva; (3) some irritating substance in the atmosphere—*the pollen of flowers,* at other times *irritating odors from animals.*

Prophylaxis.—The removal to a proper climate is the best prophylaxis as well as an indication for treatment; in this country, Michigan and the White Mountains are especially recommended. Sometimes the sea air gives relief. The essential point is that the patient leave home before the onset of the disease; furthermore it is important that any existing nasal obstruction be overcome by caustics, snare or drill.

Treatment.—The treatment may be divided into that during the attack, and that in the interval. In judging the effects of a remedy in hay fever during the attack, one must not forget that climatic and seasonal influences vary, that is, the severity of an attack depends largely upon the atmospheric conditions. Again the personal equation should not be overlooked, psychic conditions playing a large rôle in hay fever subjects.

There is both *specific* and *palliative* treatment. The former is Dunbar's Pollantin, obtained from animals inoculated with pollen toxin of various graminae. It is obtainable in powder, salve and liquid form, and is snuffed up into the nose several times a day. *Pollantin* is a useful remedy, but it is not always efficacious.

For the purpose of giving immediate relief, the nose may be swabbed with a 2 per cent cocain solution or a 1 to 1,000 adrenalin solution, after which the following preparation, in spray form, is of benefit:

Menthol	gr. xlv	3,0
Camphor	gr. xx	1,3
Eucalyptol	ʒi	4,0
Ol. pini	min. xxx	2,0
Benzoinol q. s. ad	ʒii	60,0

S. Spray into the nose several times a day.

E. Fletcher Ingals suggests the following:

Adrenalini chloridi	gr. ss	0,03
Resorcin	gr. v	0,33
Acidi borici	gr. xv	1,0
Aq. camphoraé	fl. ʒss	15,0
Glycerini	fl. ʒss	2,0
Ad. dest. q. s. ad	ʒii	60,0

S. Use as a spray to nose four or five times daily.

Constitutional treatment during an attack of hay fever should be directed toward remedying the nervous condition of the patient. The treatment of these patients in the interval between the attacks should consist in first searching for any pathological condition within the nose and remedying it, in the hope that the special sensitive portions of the mucous membrane may be eradicated.

Inflammation and Suppuration of Accessory Sinuses

Definition and Etiology.—Acute inflammation of the mucous membrane lining the accessory sinuses of the nose is a not uncommon occurrence, complicating an acute rhinitis, or it may follow any of the infectious diseases. The antrum is frequently infected from extension of caries and suppuration around the roots of the bicuspid and molar teeth of the upper jaw.

Treatment.—The treatment of the acute sinus disease may be divided into constitutional and local. The constitutional treatment should be that which ordinarily would be directed to the original infection, that is, constitutional treatment for influenza, pneumonia, etc.

Local Treatment.—After applying cocain and adrenalin solution (1 to 1,000) to the middle turbinate and middle meatus twice daily, the nasal cavity should be irrigated with warm saline solution. A spray of menthol in albolene should be ordered for home use. Heat in any form will give relief to some of the neuralgic symptoms. Should the disease continue and become chronic, proper drainage must be secured by resection of obstructing tissues, followed by lavage of the sinus with warm saline or boric acid solutions.

The indications calling for radical *operative interference* are orbital or cerebral complications. Operations for ethmoid disease are occasionally followed by fatal meningitis.

Diseases of the Upper Respiratory Tract

Pharyngitis chronica hypertrophica

(*Chronic Hypertrophic Pharyngitis*)

Definition and Etiology.—A chronic inflammation of the mucous membrane of the pharynx characterized by hyperplasia. In many cases the process begins in childhood—especially in children prone to lymphatic disturbances. Hypertrophic conditions within the nasopharynx are also seen in those who are debilitated and anemic, and are frequently associated with the common constitutional diseases. The improper or excessive use of the voice will frequently produce it. Heavy drinkers and incessant smokers are subject to this ailment.

Treatment.—The treatment is both local and general. Great stress must be laid upon the latter. The physician should inquire into the diathesis of the patient and seek to correct any of the conditions that might be causative factors. The nose and nasopharynx should be examined and any diseased condition found should be remedied.

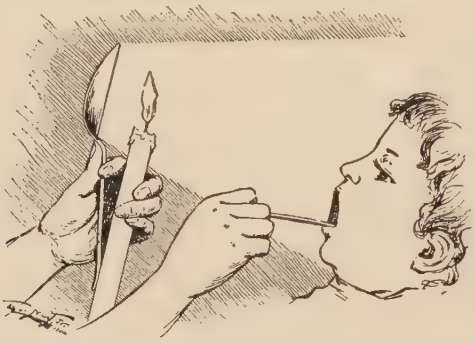


Fig. 113.—Household Reflector.

Local Treatment.—The local treatment consists in spraying or allowing lozenges to dissolve in the mouth.

For spraying, soda bicarbonate 2 to 4 per cent, listerine, boric acid, or any mild antiseptic may be used. Lozenges containing potassium chlorate, menthol, cubebs, ammonium chlorid and benzoic acid are of service.

For topical application iodin, zinc sulphate, silver nitrate and many other drugs have been recommended. If possible instruct the patient to paint the posterior pharyngeal wall every day with the following:

℞	Iodini	gr. x	0,6
	Potass. iodidi	gr. xx	1,3
	Glycerini	ʒi	30,0

About twice a week the physician should apply a 5 per cent solution of freshly prepared silver nitrate to the thickened mucosa.

Pharyngitis chronica granularis

(*Clergyman's Sore Throat*)

Definition and Etiology.—A chronic inflammation of the pharyngeal mucosa which is accompanied by a swelling of the follicles. The causes of this disease are practically the same as those of chronic hypertrophic pharyngitis. The improper or excessive use of the voice is one of the chief factors in its causation.

Treatment.—The constitutional treatment is the same as in chronic hypertrophic pharyngitis. Patients should also receive instructions in regard to the proper use of the voice.

Local Treatment.—The local treatment, besides that given under hypertrophic pharyngitis, consists in reducing the swollen follicles by means of the galvanocautery, or the silver nitrate stick or solution.

Spraying the nasopharynx three times a day with benzoinated albolene is helpful.

Pharyngitis chronica atrophica

Definition and Etiology.—A chronic inflammation resulting in atrophy of the mucous membrane of the pharynx. The disease is commonly associated with atrophic rhinitis, and the same causes which produce this disease are consequently the etiological factors of the former.

Treatment.—The treatment consists first in prescribing a spray to soften and loosen the thick mucus. For this purpose a spray of potassium chlorate (2 per cent) serves very well. The pharynx should then be painted with such substances as will stimulate the glands to greater activity. The patient should be instructed how to paint the posterior pharyngeal wall, using boroglycerid night and morning for a period of about two weeks. He should then change to the following spray:

℞	Menthol	gr. xx	1,3
	Eucalyptol	ʒi	4,0
	Benzoinol q. s. ad	ʒi	30,0

These two preparations should be used alternately, changing every two to three weeks.

Non-diphtheric Pseudomembranous Pharyngitis

Etiology.—This is a simple membranous pharyngitis due to infection by pneumococci or streptococci. The chief difference between this form of pharyngitis and diphtheria is that the mucous membrane is not deeply involved, true ulceration never occurs, and the Klebs-Loeffler bacillus is absent. The inflammation is, however, of such a character that a false membrane develops with desquamation of the epithelium. If the membrane is removed, the tissues beneath may bleed, very much as they do in diphtheria.

Treatment.—The treatment consists in washing the infected parts thoroughly with a spray of normal salt solution and following this with a solution of hydrogen peroxid and water, half and half. If this condition persists gargling with pure alcohol or spraying with ¼ per cent formalin solution in water may be practiced. Three thousand units of diphtheria antitoxin should be injected hypodermically as a prophylactic against a mixed infection (diphtheria).

Angina Ludovici

(*Acute Phlegmonous Pharyngitis*)

Definition and Etiology.—Ludwig's angina is a diffuse phlegmonous inflammation of the floor of the mouth and of the intermuscular sub-

cutaneous tissues of the submaxillary region. It may end in resolution, abscess, or gangrene. In medical practice this is seen as a secondary inflammation in specific fevers—especially diphtheria and scarlet fever. It may, however, occur idiopathically.

Treatment.—The treatment is purely surgical and must be based upon three principles: early and free incision, careful subsequent antisepsis, constitutional support.

Retropharyngeal Abscesses

Definition and Etiology.—A collection of pus in the connective tissue beneath the mucous membrane of the pharynx. Tuberculosis, rickets and inherited syphilis in children predispose to this disease. It is often seen following acute infectious diseases of childhood. Caries of the cervical vertebrae is sometimes an etiological factor.

Treatment.—The treatment is purely surgical, as the abscess must be evacuated by free incision.

Neuroses of the Pharynx

Etiology.—Neuroses of the pharynx may involve either the motor or sensory nerves. The condition is very frequently associated with hysteria or is due to swollen papillae, granulation tissue in patches, etc.

Treatment.—A careful examination should first be made to determine the presence of any local inflammatory condition in the throat. Relief of any diseased condition detected in this region assists greatly in controlling the spasms. Again the effect of this treatment may be partially psychic. Constitutional treatment should be directed toward the nervous complaint of the patient. Sedatives such as valerian, asafetida, bromids and tonics such as iron and fresh air are among the most valuable. Change of scene, and interesting the patients in pursuits that will divert their minds from their condition, will very materially assist in the cure.

Mycosis of the Pharynx

Definition and Etiology.—A parasitic disease of the tonsil, tongue and pharyngeal mucous membrane due to the invasion of fungi. The disease occurs most frequently between the ages of twenty and thirty-five, especially when the teeth are decayed.

Treatment.—A spray of ¼ per cent formalin solution in water frequently checks the growth of these masses, but the best method of removing them is by use of the galvanocautery electrode.

Adenoids and Adenoiditis

Definition and Etiology.—An hypertrophy of the lymphoid tissue at the vault of the nasopharynx. It is seen most frequently in children be-

tween the age of three to twelve years, and why it occurs in some individuals and not in others is a problem yet to be solved.

Treatment.—The removal of the lymphoid tissues by surgical means is the only rational treatment. After this is performed the internal administration of such remedies as syrup of the iodid of iron, Fowler's solution, or potassium iodid is beneficial. *Adenoiditis* gives a choked breathing, muffled voice, convulsive cough and fever.

Pertussis

(*Whooping-cough*)

Definition and Etiology.—Pertussis is a contagious disease characterized by catarrh of the respiratory passages and a series of convulsive coughs, which end in a long drawn inspiration or "whoop." The disease occurs in epidemic form, but sporadic cases occasionally appear. Children between the first and second dentition are most liable to be attacked, especially if they are delicate or suffer with nasal or bronchial catarrh. Adults can also have pertussis.

Symptomatology.—Pertussis is at first localized in the upper respiratory tract, but the possibility of a systemic invasion cannot be dismissed on account of three phenomena: leukocytosis, febrile reaction, and conferred immunity.

There is also a marked nervous manifestation, as shown by the convulsive nature of the paroxysms, glottic spasm and vomiting. This ailment is attributed to the Bordet-Gengou bacillus, but so far the proof is lacking.

Clinical Course.—The period of incubation is a week to ten days, after which the spasmodic character of the cough is in evidence. Fairly close contact is necessary for infection, but little or nothing is known as regards susceptibility to this infection. This disease is dangerous to infants and young children.

Complications are frequent and distressing, the most common and severe being bronchopneumonia, which runs a protracted course and occasionally leads to empyema, emphysema and, more rarely, to bronchiectasis. Hemoptysis, epistaxis, subconjunctival and subcutaneous hemorrhages, although less dangerous, are fairly common. Vomiting of food during the paroxysm is a regular occurrence and when unattended by a febrile reaction need not be alarming. Nutrition is seldom materially affected if the child is fed frequently. Rupture of the heart during paroxysm is fortunately rare; convulsions, although not uncommon, are seldom fatal. It is astonishing how very ill a child may become and yet recover. Loss of appetite usually means a rise of temperature and the onset of pneumonia.

Prophylaxis.—As pertussis is a contagious disease, the child should be

isolated from other children and not be exposed in public in any way. Quarantine should be continued for at least six weeks or until the spasmodic stage is over, although it is now considered not to be contagious for more than two weeks after the spasmodic whoop begins. The room which the child occupied should then be fumigated.

Control of the disease is as difficult as the control of measles. Prophylactic injection of pertussis vaccine has been suggested.

Treatment.—Vaccine treatment for whooping-cough is now the routine.

Fig. 114.—Whooping-cough Belt. (Courtesy of Dr. Kilmer.)

Hygiene and general management of the case is most important. Much harm is done by indiscriminate drugging. If the paroxysms are very severe, or in a complicated form, the patient should remain in bed, otherwise this is not necessary. Fresh air night and day is very important, but it is equally important that the air must be free from dust (preferably sea air). Careful eating and attention to the bowels are matters of the greatest importance. At times eating is difficult, since vomiting occurs so easily. When the appetite remains unimpaired, the child may be kept to its normal diet, given at short intervals. If the appetite is below normal or entirely gone, then easily digested concentrated foods should be given. The food should be non-irritating, as every irritation of the pharynx will be followed by a paroxysm.

The method of treatment consists in giving three to four subcutaneous injections of pertussis vaccine (one every other day), after which for a period of three or four days antipyrin is given (gr. ii t.i.d.). The whoop usually disappears between the third and fourth injection. Should it persist another series of three injections may be given. The non-specific cough is subsequently treated with antipyrin or sodium bromid and belladonna.

The initial dose for children less than one year old is 250 million or

ganisms. This dose is doubled every second day, i. e., the subsequent doses are 500, 1,000, 2,000, 4,000, and if necessary 5,000 and even 10,000 millions. Children over a year receive an initial dose of 500 millions; adults receive one billion.

Drug Treatment.—During the day several doses of bromid of sodium with belladonna in orange flower syrup may be given. At night one or two doses of antipyrin, gr. iii (0,2), seem to lessen the number and severity of the paroxysms.

℞	Sod. bromid	ʒiss	6,0
	Extr. belladonna fl	gtt. vii	0,5
	Syrup. flor. aurant	ʒiii	90,0

Sig. One teaspoonful every 4 hours.

Benzyl benzoate in 2 to 5 drop doses, well diluted, may be tried.

If the patient can be taken to the *seashore* drugs are rarely needed.

Insufflation of drugs in powder form is not to be recommended.

Suggestive Therapeutics in Pertussis.—At a meeting of the Vienna Medical Society, Hamburger reported a case of whooping-cough, which he treated effectively by means of the psychical or suggestive method inaugurated by Czerny of Heidelberg. The case was that of a child three and one-half years old who had suffered for more than five weeks from whooping-cough and who was cured with the aid of faradization within two days. Hamburger believes that pertussis, if of more than five weeks' duration, is often but a neurosis and easily influenced by energetic suggestive therapy. For this purpose Hamburger thinks that faradization is very well adapted.

A severe paroxysm can be stopped promptly for the time being, by standing behind the patient and forcing the lower jaw outward and upward with the fingers of both hands, as is done in asphyxia during anesthesia.

Dr. Kilmer of New York claims that the wearing of an elastic abdominal belt is beneficial in 95 per cent of cases of pertussis.

Diseases of the Throat

Vincent's Angina

Diphtheroid Sore Throat

Definition and Etiology.—A diphtheroid throat affection, first described by Vincent in 1898, mildly contagious, caused by a fusiform bacillus and spirillum generally known by the name of Vincent. Lowered bodily re-

sistance, diseased tonsils, teeth and gums, act as predisposing factors. The exciting cause is the Bacillus and Spirillum of Vincent.

Symptomatology.—According to Vincent, two clinical forms are recognizable: (1) The ulcero-membranous, by far the more common, in which both the bacillus and spirillum are found. The initial symptoms are those of an acute tonsillitis or pharyngitis, malaise, headache, fever, generally slight, and dysphagia. Objectively, there is at first redness of fauces and tonsils, fetid breath, coated tongue, and swelling of submaxillary glands. Later, on tonsils and pillars is seen a soft friable yellowish slough, slightly adherent with marked ulceration of subjacent mucous membrane, easily bleeding on touch. Deep and extensive ulceration of tonsils, pillars and palate may follow, with loss of tissue and subsequent contraction.

(2) The diphtheroid variety is very rare, about two per cent of all cases. It is due to the fusiform bacillus alone. The distinguishing feature of this form is a distinct false membrane, resting on an inflamed slightly ulcerating base; clinically, the two forms are otherwise alike.

Diagnosis.—Vincent's angina must be distinguished from diphtheria, syphilis and simple anginas.

Prophylaxis and Treatment.—The prophylactic treatment of Vincent's angina embraces care and attention to the condition of the teeth, gums, mouth and tonsils, and avoidance of disease carriers. In the actual treatment of the throat lesion, various antiseptics have been used, such as hydrogen peroxid, tincture of iodin, Lugol's solution, applications of silver nitrate, (5 per cent) chromic acid, etc. Orthoform tablets are useful in alleviating the dysphagia. Recently salvarsan has been used, both locally and intravenously, the theory being that Vincent's angina is a spirillum disease. However, this treatment is still in the experimental stage and is hardly necessary, because the throat affection responds to milder measures. In doubtful cases a medium dose of diphtheria antitoxin may be injected. The nasopharyngeal toilet should be employed for local cleansing.

Septic Sore Throat

Etiology.—Septic sore throat seems to be a milk-borne disease. The germs found in the inflamed udders, in the raw milk, and in the throats of those infected are the same, namely, the *Streptococcus pyogenes.*

The largest epidemics have occurred in Boston, Baltimore and Chicago, and in all, about 25,000 individuals have been attacked. The death rate is small, and is due to complications.

Symptomatology.—The clinical symptoms have been the same in all of these epidemics: the throats generally show intense hyperemia with a grayish exudate; the cervical lymph glands enlarge, and may suppurate; there is extreme prostration, and a tendency to relapse.

The complications are inflammation of the middle ear, abscess around

or about the tonsils, and erysipelas or other skin eruptions. The most dangerous and fatal complication is peritonitis, and there may be fatal septicemia, with localization in the lungs. Endocarditis, myocarditis, arthritis, and nephritis may occur as complications in this septic process.

Prophylaxis and Treatment.—Means of prevention of septic sore throat in epidemics must include a more frequent bacteriologic examination of the udders of cows and of the throats of those who handle raw milk. Pasteurization of milk would prevent these germs from causing infection.

The treatment of these septic sore throats is not much different from that of follicular tonsillitis, swabbing with dilute hydrogen peroxid solutions 1: 4, immediate subsequent washings with mild alkaline cleansing solutions, and the local application of a weak iodin solution, as Lugol's solution.

On account of the prostration, the patient should receive plenty of nutriment. The bowels should be moved daily.

An autogenous vaccine would no doubt be of specific value. In several of the author's cases which did not respond to the treatment outlined above, the injection of two doses of diphtheria antitoxin à 3,000 units was followed by rapid improvement.

Peritonsillar Abscess

(*Quinsy Sore Throat*)

Definition and Etiology.—A purulent inflammation invading the loose connective tissue, external to the tonsils, usually resulting in an abscess. The causes are practically the same as those of acute tonsillitis.

Treatment.—The treatment at the onset is the same as that of acute tonsillitis. As soon as peritonsillar infiltration with the formation of pus is discovered, the treatment becomes surgical, and consists in making a vertical incision into the most prominent portion of the swelling.

Enucleation of the tonsil is probably the best prophylactic measure against quinsy.

Acute Tonsillitis

Definition and Etiology.—An acute inflammation of the parenchyma of the tonsil. The disease is most common in the fall, winter and spring months, especially among those who have enlarged tonsils. As inflammation of the tonsil is an etiological factor in rheumatism, endocarditis and other severe infections, the proper management of the tonsils liable to give trouble is all important.

Prophylaxis.—Tonsillitis is communicable, therefore preventive measures are the same as in other infections: avoidance of disease carriers, nasopharyngeal toilet, gargling after eating; tonsillotomy and tonsil-

lectomy for hypertrophic and diseased tonsils; removal of adenoids and carious teeth, if present.

Treatment.—Treatment should begin with a brisk cathartic. In addition to gargling every hour with two per cent potassium chlorid solution, the nasopharyngeal toilet should be practised every two hours (*see* Section on Bedside and Office Technic).

If the patient is a child, living in a community in which diphtheria is endemic, 1,000 units of diphtheria antitoxin should be injected at once, because many cases of tonsillitis with a punctate pseudomembrane develop into tonsillar diphtheria.

The sickroom must be thoroughly ventilated day and night. Fever is reduced by means of cool sponge baths. *Cold* may be applied to the throat in the form of compresses.

A spray of formalin solution (¼ per cent) may be directed to the tonsils several times a day, or *formamint* lozenges may be sucked.

Essence of pepsin containing three drops of dilute *muriatic acid* to the teaspoonful is the only internal medication needed, because it will aid digestion and not upset the stomach.

If vomiting is a prominent symptom, one drop of tincture of iodin in sweetened peppermint water given every hour will check it.

Diet.—The proper diet is a liquid or soft diet with plenty of fruit juice.

Prophylaxis.—Prophylactic measures should be instituted after the termination of the first attack. Adhesions between tonsils and pillars should be severed and submerged diseased tonsils or hypertrophic diseased tonsils should be removed.

Enlarged Tonsils

Hypertrophic tonsils frequently give rise to local, as well as constitutional, disturbances. In children they are frequently associated with adenoids, and are the cause of mouth breathing, and catarrhal conditions in the nasopharynx.

In very mild cases of this nature the symptoms may be overcome by using the nasopharyngeal toilet twice a day as a routine measure.

As a rule it is best to remove both tonsils and adenoids at one sitting, under anesthesia, and do circumcision at the same time in boys who have an elongated prepuce, or phimosis.

If the operation is not an immediate necessity, which is rarely the case, it is well to employ the nasopharyngeal toilet for a week previous to operation in order to have the nose and throat as clean as possible. If a *pseudomembrane* develops after the operation it is wise to give 3,000 units of diphtheria antitoxin and not wait for a confirmatory smear or culture report. It is not wise to operate during epidemics of cerebrospinal meningitis.

The question as to tonsillotomy or radical tonsillectomy must be decided after due consideration of all points involved in each individual case. Adults can have enlarged tonsils reduced gradually by means of a fenestrated gauge under local anesthesia, or they can have them resected or enucleated.

Tonsillotomy in adults is not infrequently followed by brisk hemorrhage which may be controlled by pressure of the thumb on the bleeding stump (*see* also Thrombo-plastine as a hemostatic after tonsillectomy, Section on Blood Diseases).

Reduction of hyperthropic tonsils and adenoid tissue by means of x-ray has been practiced by Dr. W. D. Witherbee (Jour. of Exp. Med., June, 1921).

The aftertreatment of throat operations is that for simple sore throat.

Indications for Removal of Tonsils.—Some of the chief indications which render complete removal advisable are:[1]

1. Any interference with respiration, night or day.
2. Threatened alteration of voice or articulation.
3. Eustachian catarrh, or the presence of middle ear affections.
4. Chronic enlargements of the cervical gland.
5. Chronic lacunar tonsillitis or the cheesy collections in the supratonsillar fossa or between the tonsil and the pillars.
6. If adenoids are present and are to be operated on, the opportunity of the anesthetic should be utilized to remove any decided tonsillar hypertrophy.
7. Attacks due to septic absorption through the tonsils or a chronic condition of ill-health which can be attributed to infection through the tonsillar area.
8. Frequent attacks of tonsillar inflammation or of peritonsillar abscess.

In most cases it is the septic state of tonsils, rather than size, which determines the question of removal. Some of the largest tonsils give rise to the least local inflammatory trouble. Again, in regard to the removal of tonsils with adenoids, it is sometimes held that if the latter are cleared away the palatine tonsils will atrophy.

Concretions of the Tonsil

Definition.—Sandlike deposits or calculi in the crypts of the tonsils.

Treatment.—After cocainization an incision should be made into the tonsillar substances down to the concretion which can readily be abstracted with a pair of forceps. Antiseptic solutions are afterwards in order.

Leptothrix of the Tonsil

See Minor Ailments.

Edema of Uvula

Etiology.—This condition is frequently met with in acute pharyngitis and tonsillitis, also in all acute inflammatory conditions involving the soft palate and occasionally in chronic nephritis.

Treatment.—The use of an astringent spray, such as glycerite of tannin

[1] Dr. McCurry, *Pediatrics*, Sept., 1914.

(one dram), water (one ounce), suffices to reduce the organ nearly to its normal size. The sucking of a piece of ice is also beneficial.

Chronic Elongation of the Uvula

Etiology.—This condition is frequently seen in those who are subject to frequent attacks of acute pharyngitis and in those who have chronic pharyngitis.

Treatment.—Palliative treatment, such as the use of astringent spray, is of little use. The uvula should be cut short. Brisk hemorrhage from a cut uvula is readily controlled by gargling with alum water or by the hemostatic forceps.

Enlarged Thymus Gland

This condition is not rare in infants.

Diagnosis.—An abnormal substernal percussion dullness and the characteristic shadow in the röntgenogram make a positive diagnosis.

Treatment.—Exposure to the x-rays at intervals of forty-eight hours has resulted in a reduction of the size of the thymus gland. Urgent pressure symptoms demand surgical treatment. Iodids may be administered over long periods.

Conditions Caused by Enlarged Thymus Gland.—These are the following:

(1) Tracheal stenosis
(2) Pressure by the gland upon the circulatory system and nerves
(3) Status lymphaticus
(4) Laryngospasm
(5) Dyscrasias caused by functional troubles of the gland itself.

Diseases of the Larynx

Laryngitis acuta

Definition and Etiology.—An acute inflammation of the mucous membrane of the larynx. All chronic affections of the upper respiratory tract, especially those that produce obstruction to nasal breathing, are predisposing factors. Exposure to cold draughts, sudden climatic changes, inhalation of dust and irritating fumes, and the improper use of the voice are among the important exciting causes. Acute laryngitis is also frequently associated with the acute infectious diseases.

Treatment.—The treatment of acute laryngitis is identical in many respects with that directed against acute inflammatory conditions elsewhere in the upper respiratory tract. It may be divided into constitutional and local. The constitutional is much the same as that of acute rhinitis and pharyngitis. The patient should remain indoors in bad

weather, preferably in a warm room, and in severe cases be kept in bed. Anything that tends to increase irritation of the larynx, such as talking, singing or smoking, should be guarded against. Free evacuation from the bowels should be produced by the administration of calomel followed by a saline aperient. On retiring the patient may wear a wet compress over night, covered by a flannel binder, and he should spray benzoinated albolene into the throat while breathing deeply.

The thick tenacious mucus, which frequently accumulates in the larynx over night, may be loosened so that cough and expectoration are made free by advising the patient to sip a glass of very hot milk or hot milk and seltzer soon after awakening. The irritating laryngeal cough is best controlled by the administration of codein (grs. one-quarter to one-half) or heroin (grs. one-twelfth) every four hours. After the first forty-eight hours, a stimulating expectorant is often valuable, making expectoration of the mucus easier.

The following is given as an example:

℞	Ammon. chlor.	ʒss	2,0
	Codein	gr. i	0,06
	Syr. Pruni. Virg.	ʒii	60,0

Sig.: One teaspoonful every 4 hours.

The local treatment should be directed toward allaying the irritability of the larynx. This is accomplished by the use of compound tincture of benzoin, which is placed in boiling hot water (one ounce to the pint) and the steam inhaled as it rises from a pitcher or as it passes out of the nozzle of a deep coffee pot. These inhalations should be resorted to six or eight times a day. An oil atomizer, spraying the following mixture, may be used:

℞	Menthol	gr. xxx	2,0
	Camphor	gr. xx	1,3
	Eucalyptol	min. xx	1,3
	Ol. rosae	min. iii	0,2
	Benzoinol q. s. ad	ʒii	60,0

Each time the bulb is compressed the patient should take a deep inspiration. The fine spray is thus drawn into the larynx and trachea with the inspired air. Counterirritation over the larynx and upper portion of the chest gives great relief. A mustard plaster, turpentine and sweet oil (equal parts) or tincture of iodin are generally preferred.

If this simple management fails the larynx should be cauterized with silver nitrate solution (10 grains to one oz.).

Laryngitis chronica hypertrophica

Definition and Etiology.—A chronic inflammation of the mucous membrane and submucous tissues of the larynx, accompanied by swelling of the tissues. The disease may follow recurring attacks of acute laryngitis. Besides the causes given under acute laryngitis, mouth breathing and excessive smoking or chronic alcoholism may be mentioned. It is also frequently associated with those chronic pulmonary affections such as asthma, emphysema, chronic bronchitis and tuberculosis, in all of which coughing is a common symptom.

Treatment.—The treatment of this affection cannot be successful unless the etiological factors are fully known and remedied as far as possible. After this the first order must be vocal rest—the more complete the better. The patient should live in pure air, and it is better to give up smoking entirely. The internal administration of saline laxatives is often of the greatest assistance in depleting the congested state of the blood vessels, so frequently found in this disease.

During the day medicated lozenges containing benzoic acid, menthol or krameria are beneficial. Steam inhalations, especially with the resinous substances such as are contained in the compound tincture of benzoin, are especially soothing and relieve much of the irritation, but far better results are obtained if the medicated steam is applied methodically and regularly, as may be done in well-equipped inhalatoria, under the direction of a competent physician. When this is not obtainable, special inhalation apparatus may be obtained, and this form of treatment may be carried out under the physician's personal supervision.

There are two methods of inhaling: in the first the medicament is atomized to impalpable vapor by means of sterilized air in a cabinet, while in the second the inhalation is through a sterile mouthpiece or nosepiece.

The medicated steam, a mixture of compound tincture of benzoin (1 in 20) is inhaled at a temperature of from 140° to 170° F. for about fifteen minutes. This is followed by inhalations of an oily substance without the aid of heat. The following may be used for cabinet inhalation:

℞	Camphor	ʒi	4,0
	Oil of tar	ʒii	8,0
	Iodin	gr. xx	1,3
	Creosote	ʒi	4,0
	Menthol	gr. xxx	2,0
	Ol. sesame	℥iv	120,0

The patient should remain indoors for from fifteen to thirty minutes after each treatment. The use of alcohol is prohibited.

Palliative local applications may be made in the form of a spray of the following mixture:

℞	Menthol	gr. xxx	2,0
	Eucalyptol	ʒi	4,0
	Ol. pini	min. xx	1,3
	Benzoinol q. s. ad	ʒii	60,0

Direct applications to the laryngeal mucous membrane should be made with the laryngeal applicator by the physician. Silver nitrate (2 per cent) or zinc chlorid (2 per cent) is generally used. For detailed information regarding this procedure, the reader is referred to books on laryngology.

Faulty methods in vocalization should be corrected. Often a complete change of air and surroundings is advisable, and a few days' sojourn at some seacoast resort under favorable weather conditions may be of great benefit.

Cold sponging of the upper part of the body, the wearing of proper clothing, regularity as to meals and regulation of the bowels should be part and parcel of the directions toward the cure and prevention of recurrence of chronic laryngitis.

On the other hand a number of patients will assert that they have been cured by allowing their beards to grow or by wearing mufflers.

Pachydermia laryngis

Definition and Etiology.—A rare disease accompanied by replacement of the normal epithelium on the cords in limited areas by nodules composed of stratified epithelial cells. The disease is usually associated with chronic hypertrophic laryngitis, especially in those giving a history of chronic alcoholism or excessive smoking.

Treatment.—Treatment consists in giving the voice a rest, and insisting that the patient refrain from even the moderate use of alcohol and tobacco. Zinc chlorid (2 per cent) applications to the laryngeal mucous membrane usually materially assist in the absorption of the nodules. Where the growths are large, it is often necessary to remove the greater portion of them by means of the punch forceps. For description of this operation the reader is referred to books on laryngology.

Perichondritis of the Larynx

Definition and Etiology.—An acute destructive inflammation of the perichondrium of the laryngeal cartilages. This condition may follow stab wounds or severe blows on the larynx. The disease is usually secondary to syphilis, tuberculosis, or malignant disease of the larynx.

Treatment.—Perichondritis, once recognized, should be treated surgically with promptness.

Luetic cases require specific management.

Edema of the Larynx

(*Edema glottidis*)

Definition and Etiology.—A dropsical effusion into the submucous cellular tissue of the aryteno-epiglottic folds, causing them to project as large rounded swellings on either side of the circular isthmus of the larynx. They may be of sufficient size to cause severe or even fatal obstruction to respiration. Among the local causes may be mentioned mechanical irritations of foreign bodies, the inhalation of steam or irritating gases, and the inflammation of the larynx that accompanies erysipelas, diphtheria, scarlet fever, influenza, and whooping-cough. Perichondritis of the larynx, abscesses of the larynx, peritonsillar abscess and Ludwig's angina are also likely to produce edema. The important constitutional causes are Bright's disease, diabetes, and cardiac lesions, accompanied by general anasarca.

Treatment.—If of moderate severity with no cyanosis, sucking and swallowing small pieces of cracked ice and the application of ice bags to the neck often afford great relief. If the swelling does not disappear and dyspnea increases, the mucous membrane should be freely sprayed with adrenalin solution (1 to 1,000) containing cocain (one per cent). The air in the room should be kept moist by means of boiling water.

When breathing becomes labored and stenotic, scarification of the swollen tissues by means of a curved bistoury may be done. If stenosis increases to the danger point, tracheotomy must be done promptly in adults, or intubation in children. The high rate of mortality is due to the fact that operative relief is too long delayed.

Benign Tumors of the Larynx—Papillomata of the Larynx

Definition and Etiology.—The exciting causes of these growths is unknown. Occasionally there is a history of irritation of the laryngeal mucous membrane, such as in chronic laryngitis. The varieties of tumors found are papillomata, fibromata, cysts, polypi, lipomata, angiomata, chondromata, and adenomata. Papillomata are met with more frequently than all the other varieties combined.

Treatment.—The treatment of these cases belongs to the specialist. The tumor should be removed in whatever manner seems most likely to effect a cure, with the least danger to the patient, so far as life and the subsequent use of the voice are concerned.

Laryngospasm

(*Laryngismus stridulus*)

Definition and Etiology.—A spasmodic closure of the larynx, of nervous origin. It occurs in children between the ages of six months and three years; and is most commonly seen in connection with rickets and in those born of neurotic parents. Laryngismus and adenoids frequently go together.

Treatment.—If the attack is severe and the lividity is great, it is good treatment to dash cold water into the face. Sometimes the introduction of the finger far back into the throat will relieve the spasm. At other times a few drops of chloroform placed on a handkerchief and held over the child's face will give speedy relief.

In the interval between the attacks, all sources of irritation should be searched for and removed. The gums should be carefully examined and if swollen and hot, freely lanced. Disorders of digestion must be corrected and hearty eating at night prohibited. The bowels also should be carefully regulated. Cold sponging has proved very satisfactory. Every day the child should be placed into a warm bath and its back and chest thoroughly sponged for a minute or two with cold water. Adenoids should be removed.

The syrup of iodid of iron should be administered internally.

Intubation for severe laryngospasm has been practiced but is hardly ever needed.

Chronic Laryngeal Stenosis

Chronic laryngeal stenosis is usually due to traumatism, syphilis or new growths, for which intubation, tracheotomy, dilatation, excision or antiluetic management is indicated. Chronic laryngeal stenosis following intubation is discussed under Croup.

Diseases of the Trachea

Tracheostenosis

Stenosis of the trachea through the formation of connective tissue membranes or through the adhesion of the walls is of very rare occurrence. There may be complete absence of the trachea, the bronchi being given off directly from the larynx. The acquired forms of stenosis of the trachea are for the greater part produced by conditions external to these structures—new growths in the neighboring lymph glands, aneurisms, enlarged thymus, etc. Obstruction of the passage may be produced by inflammatory conditions, foreign bodies, etc. New growths within the trachea are of rare occurrence.

Treatment.—The treatment is surgical and antisyphilitic. Recent

reports have emphasized the value of x-ray treatment in thymus enlargement in infants.

Diseases of the Bronchi

Bronchitis acuta

Definition and Etiology.—An acute catarrhal inflammation of the bronchial mucous membrane. It is a common sequel of "catching cold" and is often nothing more than the extension downward of an ordinary coryza. It occurs most frequently in the changeable weather of early spring and late autumn.

Prophylaxis.—Persons liable to contract bronchial catarrhs should take the usual precautionary measures mentioned under Acute Coryza, Acute Pharyngitis, and Acute Laryngitis.

Treatment.—In the early stages of this disease, that is, when the congestion is confined to the larger bronchi and before secretion is established, the patient should receive a hot foot bath or a warm bath and a drink of hot lemonade to which a little whisky has been added, together with a brisk cathartic. He should then go to bed immediately, in order that by inducing a profuse perspiration the bronchial congestion may be relieved. In adults, Dover's powder, from five to ten grains with a hot drink should be taken.

Children should be put to bed after an enema and a warm bath and may be given a cup of warm milk or peppermint tea, if they will take it.

If the attack is not aborted and the temperature rises, the patient should remain in bed on a fluid or soft but nourishing diet.

The sickroom should be well ventilated and older children and adults may breathe the coldest air if their bodies are well protected and warm. Infants do best if the room temperature is about 60° F.

Cough medicines and expectorants are not indicated in the early stage of bronchitis, before secretion is established—in fact they are liable to do harm by upsetting the stomach. It is much more rational to give a few drops of dilute hydrochloric acid in water three or four times a day, because it aids digestion and stimulates the appetite. If the cough is very troublesome a sedative given in long intervals may be indicated.

Children may have from five to fifteen drops of paregoric and adults one-half to 1 grain of codein or one-tenth grain heroin. This may be necessary for the purpose of "loosening up" a dry cough. Ammonium chlorid with or without a sedative will be found useful.

℞	Codein sulphatis.....	gr. iii	0,2
	Ammon. chlorid.....	ʒi	4,0
	Ext. glycyrrhiza.....	ʒi	30,0
	Aquae .....q. s. ad	ʒii ad	60,0

M. S. One teaspoonful every 2 hours in water.

Expectorants are hardly required by robust individuals. Feeble children may take from one to three drops of liquor ammoniae anisatus in sugar water three times a day as an expectorant and for aged persons the following prescription is serviceable:

℞	Potass. iodidi.....	ʒi	4,0
	Aquae	ʒv	20,0
	Liq. ammon. anisat.....	ʒiss	6,0

Sig. Twenty drops in water 3 times a day.

Inhalation of steam with turpentine, benzoin or eucalyptus is useful. Inhalation of pure cool dust-free air or sea air is best of all.

Bronchitis chronica (*non-tuberculous*)

Definition and Etiology.—A chronic inflammation of the mucous membrane of the large and middle-sized bronchial tubes, characterized by cough and more or less profuse expectoration.

Clinical Varieties.—Three varieties are here considered: (1) bronchorrhea, (2) dry catarrh, (3) fibrinous bronchitis. The first is characterized by excessive bronchial secretions which may be very liquid and watery, or purulent. The second is characterized by paroxysms of coughing of great intensity, with little or no expectoration; the third by fibrinous expectoration.

Diagnosis.—Whenever it is found that in any given patient, repeated attacks of acute bronchitis occur, not to be explained as ordinary infections, the possibility of the development or the existence of chronic bronchitis must be considered and a hardening process should be inaugurated, the principles of which are outlined in the introductory remarks of this section. Elderly persons, who are not fit subjects for a hardening process, should keep indoors during rough weather or, if possible, arrange to live in a mild climate during the winter months. Egypt, southern France, southern California and Florida furnish milder climates in which those predisposed to chronic bronchitis may live with the greatest comfort.

The first step in the management of a case of chronic bronchitis is to get a correct view of the cause of the trouble. This involves a complete clinical examination with the object of arriving at a correct diagnosis by exclusion. The following local as well as remote causes must be taken into consideration:

Peribronchial infiltration due to previous attacks of acute bronchitis.
Inhalation of irritating substances (occupational).
Tuberculosis, syphilis or cancer in lung or pleura.
Non-tuberculous suppuration foci in the lung.
Foreign body in the lung.
Asthma and emphysema.

Chronic enlargement of peribronchial glands.

Congestive conditions due to cardiac and renal diseases, or arteriosclerosis and gout.

Aneurism.

Mediastinal tumor, etc.

In rachitic children a chronic non-tuberculous bronchitis sometimes develops after measles with bronchopneumonia or pertussis and bronchopneumonia.

Finally it must be emphasized that certain chronic or non-corrected nasopharyngeal and laryngeal lesions manifest themselves by an all-year-round cough, which is not, however, due to chronic bronchitis.

Therapeutic Management.—Assuming now that our diagnostic inquiry has resulted in a diagnosis of *simple chronic bronchitis,* such as we frequently observe in older people whose lungs are slightly emphysematous, the question will arise: What kind of therapeutic management will benefit the patient?

In such cases we may resort to or recommend:

Physical exercises.

Deep-breathing exercises.

General massage.

Hydrotherapy, warm baths with local douches of cool water.

Inhalations.

Change of climate, sojourn at a spa.

Avoidance of dust.

Avoidance of overheated and crowded places.

Seasonable clothing.

Bowel regulation.

Drugs.

Massage and *hydrotherapy* can profitably be discussed, only in connection with a given case. Generally speaking all such efforts should be applied in moderation.

Apart from the money consideration, the choice of a *climate* is largely determined by the character of the expectoration. To reduce expectoration dry climates should be selected; to increase it moist places should be chosen. The dry forms are best treated in Algiers, Corsica, Cannes, Nizza, Mentone, abroad; in this country the coast of Florida and southern California are of great service. In cases with moderate secretion the interior of North or South Carolina, Georgia, or Florida may be chosen. In the very moist forms the desert in Egypt or Algiers is highly recommended; in this country, Montana, Wyoming, Colorado, northern New Mexico, western Kansas, southern New Mexico, and southern Arizona. Everything else being equal, we may expect a change from a progressive to a

stationary condition and in some cases great improvement and freedom from cough.

Spa Treatment.—Alkaline-saline and saline waters might be expected to loosen expectoration; therefore patients may be sent to Ems, Soden, Kissingen, Homburg, Carlsbad, and Marienbad for this purpose. Sulphur waters have a favorable influence in chronic bronchitis. In this country we find bronchitis patients in the White Sulphur Springs of Virginia, Richfield, Sharon, Saratoga, and many others. Abroad, Harrogate, Aix-les-Bains, Cauterets, Eaux-Bonnes are recommended.

Many of the spas are provided with elaborate inhalatoria for the administration of alkaline, balsamic and astringent sprays and radium emanations.

Inhalations at home can be readily arranged by means of a steam kettle and volatile oil preparations (*see* Bedside and Office Technic).

Drug Treatment.—There are many expectorants in use. In the writer's experience iodid of potassium, chlorid of ammonium, liquor ammonia anisatus, camphor, benzoic acid, are the most reliable. They may be given with or without sedatives, such as morphin, codein, heroin, extract of belladonna, extract of hyoscyamus.

Fig. 115.—Turpentine Pipe or Inhaler. (After Strümpell, "Textbook of Medicine.")

In chronic bronchitis with cardiac insufficiency digitalis in combination with an expectorant drug is of great value.

Bronchitis fetida

Definition and Etiology.—Fetid or putrid bronchitis, which is frequently classified as a clinical variety of chronic bronchitis, is met with in connection with bronchiectasis, gangrene, abscess, or with decomposition of secretions within phthisical cavities, and in empyema which has perforated the lungs. There are instances in which, apart from any of these states, expectoration has a fetid character.

Treatment.—Beside the treatment outlined under Chronic Bronchitis, we should endeavor to destroy the fetor as far as possible by some form of inhalation.

The following inhalation is serviceable:

℞ Creosot. (Beechwood) ..... ℥i 4,0
Eucalyptol ..... ℥i 4,0
Tr. benzoin comp. ..... ℥ii 60,0
M. S. One teaspoonful to a pint of boiling water for inhaling, several times a day.

Inhalations by means of the turpentine pipe are useful.

Bronchitis fibrinosa

Definition and Etiology.—An acute or chronic affection, characterized by the formation, in certain of the bronchial tubes, of fibrinous casts, which are expelled in paroxysms of dyspnea and cough. The disease has a grave prognosis. The direct cause is unknown.

Treatment.—As the character of the inflammation can seldom be determined until the membrane or portion of it has been expectorated, the treatment is at first the same as in attacks of ordinary acute bronchitis.

In acute cases with urgent dyspnea and cyanosis large doses of *diphtheria antitoxin* should be injected, also camphor in large doses, in view of the possibility of a diphtheritic infection of the deep respiratory tract.

If the dyspnea remains urgent, apomorphin (one-half to one-eighth grain) may be administered by hypo until vomiting is induced. This should be followed up by steam and balsam inhalations.

The *chronic form of fibrinous bronchitis* is a rare condition for which we have no other treatment than that laid down for chronic bronchitis.

Bronchial Asthma

Definition and Etiology.—A paroxysmal dyspnea probably due to spasmodic contraction of the muscular layers of the bronchi or to a vasomotor disturbance with associated bronchial catarrh. It is characterized by spasmodic attacks of distressing expiratory dyspnea, continuing several respiratory apparatus, of anaphylactic origin due to hypersensitiveness to proteins of food, pollens, animal hair, bacteria and hidden foci of infection.[1] In many cases there is possibly a family history of asthma, chorea, epilepsy, or vagotonia.

The inhalation of irritating substances, such as turpentine, dust, etc., may precipitate an attack. Nasal obstruction or emphysema with bronchitis adds to the severity of an attack. Gastric, cardiac and hysterical asthma should not be confused with bronchial asthma.

Prophylaxis and Treatment.—There are two indications to meet: the relief of the paroxysm, and the prevention of its recurrence. The paramount indication during an attack is to give relief.

The most reliable remedies are morphin sulphate and chloral hydrate.

[1] *See* cutaneous test, Section I.

The former should be given hypodermically (grs. 1/6 to ¼) combined with atropin sulphate (gr. 1/100). Chloral should be given by mouth (grs. x to xv). Benzyl benzoate in 5 to 10 drop doses, well diluted may be tried.

A few whiffs of chloroform will produce prompt though temporary relaxation. Inhalation of a few drops of amyl nitrite on a handkerchief serves to relieve the paroxysm. Drinking of strong hot black coffee or a dose of spirits of chloroform in hot whisky will sometimes produce relaxation. Pituitrin, 1,0, and adrenalin (1-1000), min. 10, are recommended by Zueblin of Baltimore. Autogenous vaccines from the sputum are suggested.

In a large number of cases in which the irritation comes from the bronchial mucous membrane, the use of potassium iodid combined with potassium bromid has proved highly beneficial:

℞	Potassi iodid.....		
	Potassi bromid.....āā	ʒi	4,0
	Aquae	℥ii	60,0
	Syr. zingiber.....	ʒii	8,0

A teaspoonful well diluted should be given two or three times at half-hour intervals, then every four hours.

Iodid of potassium can be given in combination with morphin, heroin, or belladonna.

The following is also a serviceable combination:

℞	Ammon. iodidi.....	ʒii	8,0
	Tinct. lobeliae.....	ʒii	8,0
	Tinct. belladonn.....	ʒii	8,0
	Extr. grindeliae robust. fl.....	ʒiv	15,0
	Extr. liquirit. fl.....	ʒiv	15,0
	Syr. tolu.....ad	℥iv	120,0

Sig. One teaspoonful three times a day.

Most asthmatics get relief by the inhalation of the fumes of niter, stramonium and belladonna. Excellent asthma cigarettes are now on the market. Niter paper made with a strong solution of nitrate of potash is very serviceable. Filling the room with the fumes of the paper prior to retiring will sometimes ward off a nocturnal attack. The following prescription is also highly recommended:

℞	Potassi nitratis.....		
	Pulv. anisi fruct.....	āā ℥ss	15,0
	Pulv. stramonii fol	ʒi	30,0

A thimbleful of this powder placed upon an earthenware plate should be pinched by the fingers into a pyramidal shape, and lighted at the top.

It burns with a smoldering flame, being held near and beneath the patient's face. The ingredients of the powder should be dry, well mixed, and finely powdered.

Asthmatics who have become anemic are benefited by the administration of arsenic. Iron preparations are also indicated provided they are non-constipating.

In asthma occurring in vagotonic subjects "atropia" is a sovereign remedy.

The prevention of recurrent attacks of asthma can be accomplished by proper management. Nasal obstruction should be corrected; bakers, furriers, dyestuff operators, carpet beaters and other dust breathers afflicted with asthma should be advised to change their vocation. Asthmatics should be cautioned not to overload their stomachs, and should be given advice as to how to avoid "colds"; a daily movement of the bowels should be secured and a rational hardening process by means of the cardiovascular douche should be urged.

A change of climate will benefit some asthmatics, but not all. Many patients do well in a high and dry altitude, others get relief at the seashore. Climatic changes in this disease are trial changes.

Pneumatic treatment by means of compressed or rarefied air is not very satisfactory.

Children who have had a severe type of whooping-cough which has left them with a moderate degree of emphysema frequently suffer from recurrent bronchitis with asthmatic breathing.

In such cases nasal obstruction, adenoids and large tonsils should receive proper treatment and at the same time the diet should be adjusted and *faulty metabolism* corrected, because it is looked upon as a prime provocative factor in recurrent bronchitis. Fat and sugar should be markedly reduced in the daily rations.

Small doses of *atropia* are very salutary in such cases.

A scratch test for asthma due to food idiosyncrasy is described in Section I.

Enlarged Bronchial Glands in Infancy and Childhood

Enlargement of bronchial glands may occur in other conditions than in tuberculosis. The signs of enlargement are paravertebral dullness and resistance (D'Espines sign), enlarged thoracic veins, x-ray shadows and cough.

Treatment.—When enlarged bronchial glands are suspected an out-of-door life should be arranged for the child, combined with a certain restriction of activity short of actual fatigue.

The food should be high in calories and one tablet of iodotropon may be given daily for several months.

Diseases of the Lungs

Non-Tuberculous Pulmonary Suppuration

Etiology.—Suppuration in the lung may be due to many causes such as infection, foreign bodies, mold, aspergillus, actinomycosis, syphilis, embolic processes, gangrene, blood aspiration during tonsillectomy, etc.

Clinically we observe:

Acute and chronic single and multiple abscesses
Bronchiectasis
Localized and interlobar empyemas
Perforated subphrenic appendicular and hepatic abscesses.

Prophylaxis and Treatment.—Röntgen ray explorations and bronchoscopy enable the clinician to make diagnoses as to location and extension of pulmonary lesions, far beyond the possibilities of auscultation and percussion, and this diagnostic advance has given a new impetus to lung surgery. Operative interference, however, must not be considered or undertaken too early, particularly in cases of bronchiectasis and chronic putrid abscesses and in cases in which the entire lung is riddled with small rigid walled abscesses.

Prophylaxis.—The possibility of preventing suppuration and bronchiectasis lies in the good management of the convalescent stage of whooping-cough, bronchopneumonia and influenza. Aspiration of blood during operations on the nose and throat must be carefully guarded against.

If catarrhal symptoms in the lungs persist, a radical change of climate is unquestionably indicated. The beneficial influence of a dry climate, such as we have in Arizona and in New Mexico, is well attested.

Restriction of fluids seems logical as a therapeutic measure, and topical applications of balsamic medicaments by inhalation, or injection through the bronchoscope are worthy of trial.

Hygienic living, good food, deep breathing exercises, hydrotherapeutic stimulation, are important factors in the management of pulmonary suppuration.

Medical Treatment.—Large doses of potassium iodid as much as one ounce per day for many days, followed by the administration of iodotropon—one tablet twice a day given for months—is probably the most serviceable medication. Creosote, thymol and eucalyptol may be given internally and by inhalation.

Pulmonary Congestion—Active and Passive

Etiology.—Pulmonary congestion occurs with increased action of the heart, or when very hot or very cold air or irritating substances

are inhaled. Alcoholic excesses and overexertion are causative factors.

It occurs in all forms of pulmonary infection and in cardiac insufficiency. It is a common phenomenon in debilitated typhoid fever cases and in other debilitating diseases.

Prophylaxis.—The possibility of warding off pulmonary congestion lies in good hygienic management of patients sick in bed, change of position, passive motion, exercises in bed, hydrotherapeutic measures, timely stimulation.

Treatment.—Dry or wet cupping over the congested area is a rational procedure. The patient may be kept in a bath at 110° F. for ten to fifteen minutes and diaphoresis may be induced by means of a hot pack. A saline cathartic should be given and subsequently one drop of the tincture of aconite may be administered every fifteen minutes for a two to three hour period.

Cardiac stimulants may be required, such as digitalis, camphor, caffein, and in urgent cases venesection should be done.

Pulmonary Edema

(*Serous Apoplexy*)

Definition and Etiology.—A transudation of serum into the air cells characterized by rattling dyspnea, cough and frothy blood-streaked expectoration.

It accompanies acute pulmonary inflammation and is frequently observed in cardiorenal and cerebral affections, also after parturition in women with a valvular heart lesion.

Prophylaxis and Treatment.—The treatment is practically the same as in pulmonary congestion. In urgent cases a prompt venesection may be life-saving. Inhalations of oxygen are not to be relied upon.

Pulmonary Embolism

In the acute onset the cyanotic and dyspneic patient must be kept absolutely quiet in a semirecumbent posture. Everything that increases cardiac activity must be avoided.

Should the patient survive the acute attack, the subsequent management is altogether symptomatic.

Pulmonary Infarction or Apoplexy

As a mechanical sequence of embolism and thrombosis of a pulmonary vessel, we occasionally observe a wedge-shaped hemorrhagic infarction in the lung. Small infarcts give rise to sudden pain, dyspnea, cough and

bloody expectoration usually in patients with chronic cardiac disease. Massive infarction may cause sudden death.

Prognosis.—The prognosis in small non-septic infarcts is not unfavorable. Septic infarction is often followed by *gangrene* and *abscess.*

Treatment.—The treatment is symptomatic as in pulmonary congestion.

Pneumonokoniosis

Etiology.—This form of fibroid induration and pigmentation of the lungs is due to inhalation of dust from various occupations.

Different names have been given according to the nature of the inhaled particles—thus *anthracosis* due to the inhalation of coal dust, *siderosis* due to inhalation of metallic dust, *lithosis* due to the inhalation of mineral dust.

Prophylaxis.—Prophylaxis is more important than actual treatment as the disease can be prevented but not eradicated.

As pneumonokoniosis is an occupational disease, change of occupation should be one of the prophylactic measures. Of course in a great number of instances this is quite impossible. The prevention of the inhalation of dust is another important measure. Much can be done in this line by proper instructions to both employers and employees, and the wearing of masks whenever feasible.

Treatment.—The treatment of the condition is practically that of chronic bronchitis and emphysema.

Cirrhosis of the Lung

(*Fibroid Phthisis*)

Definition and Etiology.—Cirrhosis of the lung is a chronic disease characterized by a marked overgrowth of connective tissue. Inhalation of irritating particles of stone dust, coal dust, etc., over long periods may cause it. It is in most cases due to tuberculosis, but also rises independent of that affection.

Treatment.—The treatment both prophylactic and actual is that of chronic pulmonary tuberculosis. A distressing feature in some cases is the putrefaction of the contents of the dilated tubes, for which the same measures may be used as in fetid bronchitis.

Atelectasis of the Newborn and Acquired Atelectasis

Definition and Etiology.—A partial collapse of the lung resembling the fetal condition, but occurring in a lung which has once been expanded. It may be due to compression or obstruction.

The principal causes of collapse of the lung from compression are pleuritic effusion, pneumothorax, enlargement of the heart, pericardial

effusion, and tumors of the mediastinum. Collapse from obstruction is due to two factors: plugging of either the large or small bronchial tubes or feeble inspiratory force.

Treatment.—The treatment of atelectasis caused by compression resolves itself into the treatment of pleuritic effusion, pneumothorax, pericardial effusion, etc.

Respiratory gymnastics is the essential factor in treatment of atelec-

Fig. 116.—Lung Gymnastics. Blowing a liquid from one bottle into another.

tasis due to feeble inspiratory force. Deep breathing exercises over a period of several weeks invariably increase vital or lung capacity.

Normal inspiration is longer than normal expiration, and in teaching a patient to breathe the inspiration should last three seconds and the expiration five seconds, and this should be gradually increased, second by second, until after some weeks twenty seconds are consumed in inspiration and twenty-eight in expiration, and he would have the full inspiration sustained for from two to ten seconds before exhaling. The number of respirations a minute normally vary from sixteen to twenty-four.

In the beginning respiratory exercises should be taken while the patient is lying down, so as to start with thoroughly relaxed muscles. Later they should be done while standing, with the patient erect, the head thrown

back, and sometimes with the hands clasped behind the back. In infants and children increased inspiration and expiration may be obtained by suddenly splashing small quantities of cold water upon the affected side, or by means of a cold douche, just long enough to get the respiratory reaction.

Pulmonary Emphysema

Definition and Etiology.—This is an overdistention of the alveoli with thinning of the interalveolar walls, making breathing difficult, particularly on exertion, and being associated sooner or later with dilatation of the heart.

The hereditary predisposing causes are not thoroughly understood. The exciting causes are of a mechanical or obstructive nature—for we find emphysema developing in glass blowers, players of wind instruments and following whooping-cough, asthma, bronchitis, etc.

Clinical Varieties.—The principal clinical varieties are:

Acute vesicular emphysema
Compensatory emphysema
Atrophic or senile emphysema

Prophylaxis and Treatment.—Predisposition to emphysema cannot be foretold or detected, thus the prophylactic management resolves itself into the proper management of whooping-cough, recurrent bronchitis, asthma, etc.

Special efforts should be made to harden the individual against "cold catching," as explained elsewhere. After the elasticity of the lung is destroyed, treatment is palliative, absolute *restitutio ad integrum* is not possible.

Aërotherapy is practically along the same lines as in asthma. Hydrotherapy by means of the cardiovascular tonic douche should cover long periods. Constipation and flatulence must be overcome if the patient is to be made comfortable. Breathing exercises with manual or instrumental chest compression and massage are of great benefit.

According to the writer's experience noteworthy results have not been achieved with the pneumatic cabinet or Waldenburg's apparatus, which is arranged for breathing into rarefied or compressed air. Operative excision of a portion of the costal cartilages has not been followed by permanent good results.

Palliative medication is the same as for chronic bronchitis and asthma. Simple dyspnea of a moderate type does not require the constant administration of sedatives. Nature establishes a certain degree of tolerance of air hunger, and tactful tranquilizing suggestions on the part of physicians are not without value in dyspnea.

Eventually cardiac insufficiency develops which must be treated, as outlined in Section IX.

The following prescription has the special advantage of relieving the difficulty in breathing and strengthening the heart action:

℞ Potassii iodidi..... gr. v 0,3
Strych. sulph..... gr. 1/32 0,002
Liq. potassii arsenit..... min. v 0,3
Aq. laurocerasi..... ʒi 4,0
} one dose

S. One dose to be taken several times a day if necessary.

For attacks of cyanosis a free venesection, combined with and followed by full doses of spirits of glonoin (nitroglycerin), often saves life.

Pulmonary Hemorrhage (*non-tuberculous*)

(*Hemoptysis*)

Definition and Etiology.—The expectoration of pure or unmixed blood, usually of a bright red color, following the act of coughing. In the majority of cases it is the result of tubercular deposition in the walls of the minute bronchial arteries. Excessive cardiac action, bronchial congestion, excessive bodily exertion, such as straining, lifting, or running, aneurism, cancer, or ulceration of any portion of the respiratory tract may act as causative factors.

Prophylaxis.—In non-tuberculous hemoptysis the causal factors should be ascertained and prevented as far as possible. The preventive treatment of tubercular pulmonary hemorrhage will be found in Section V, under Tuberculosis.

Treatment.—Perfect rest in bed, with the head and shoulders elevated and absolute quiet is essential. The diet should be bland and unirritating, and the drinks cool, the patient being allowed to slowly swallow small particles of ice. An ice bag placed over the chest, if it does not cause chilliness, is sometimes of value. Common salt, slowly dissolved in the mouth, is a popular remedy. The hypodermic injection of morphin sulphate (gr. ¼), combined with atropin sulphate (gr. 1/100), will usually control a hemorrhage immediately. The official one per cent solution of nitroglycerin in half minim to minim doses every half hour often promptly checks the hemorrhage. The intrapulmonary pressure may be lowered and the flow of blood consequently lessened by the application of firm ligatures to the limbs. In protracted cases, saline purgation may be of benefit.

The following prescription may also be employed:

℞ Acidi gallici..... gr. xv 1,0
Acidi sulphurici dil..... min. x 0,6
Aquae cinnamomi..... ʒiv 15,0

M. S. One teaspoonful to be given every 15 to 20 minutes.

When hemorrhage from the lung persists coagulose (dry blood serum) should be given hypodermically. This preparation is obtainable in ampules with full directions. Venous infusion of blood may be performed if a suitable donor is available (*see* Bedside and Office Technic, Section I).

After hemorrhage has ceased the patient should be kept quiet for a long time, and small doses of morphin should be given to counteract any pronounced tendency to coughing.

Lobar Pneumonia

Definition and Etiology.—Lobar pneumonia is an acute infectious pneumonitis due to a pneumococcus (Pneumococcus of Fraenkel).

The disease germ is lodged in the mouth or nasopharynx without producing symptoms. At periods of lowered resistance, brought on by exposure, anxiety, alcoholism or simple catarrhal conditions of the upper air tract or constitutional disturbance, the germ finds foothold in the lung tissue (or in other tissues) and induces active inflammation which subsides critically after a varying period—usually from three to nine days.

Clinical Course.—The period of incubation is short. Convalescence is usually rapid and sequelae are not the rule.

All ages are liable. Males are more frequently affected than females. One attack predisposes to another.

Symptomatology.—The disease is characterized by a severe chill, headache, fever, thoracic pain, dyspnea, coughing, rusty sputum, and great prostration.

Clinical Varieties.—1. Apexpneumonia. It is more often associated with marked cerebral symptoms.

2. Migratory or creeping pneumonia, a form which successively involves one lobe after the other.

3. Double pneumonia in which there is always the greatest danger.

4. Massive pneumonia in which not only the air cells but the bronchi of an entire lobe or even of a lung are filled with the exudate.

5. Central pneumonia, in which the inflammation is deep seated at the root of the lung or centrally placed in a lobe.

6. Epidemic pneumonia, in which the mortality is high.

7. Pneumonia in infants and children.

8. Pneumonia in the aged.

9. Toxic or typhoid pneumonia.

10. Secondary and terminal pneumonia.

11. Lobar pneumonia (mild abortive type).

12. Pneumonia with delayed resolution.

Prognosis.—In adults the prognosis is "in dubio." In children the prognosis is fairly good.

Prophylaxis.—Persons who have had pneumonia must keep their teeth

in perfect condition and practice the nasopharyngeal toilet daily. Nasal obstruction must be overcome surgically.

Persons in a lowered state of health should avoid crowded and overheated places, sickrooms, dust, etc. Sputum in every case should be burnt. Persons who have caught "cold" should, if possible, rest in bed in a well-ventilated, cool room.

Dr. D. W. Park, Director of Laboratories, Department of Health of the City of New York, recommends the use of a prophylactic vaccine containing the organisms of types 1, 2 and 3 pneumonic.

Drastic laws should also be issued and enforced against expectorating on the sidewalks. The general public should be enlightened by state and municipal boards of health with reference to efficient ventilation of office buildings, theaters, courts of law, manufacturing establishments, churches, public schools, and passenger cars.

Treatment.—A patient suffering from pneumonia should be put to bed and kept there until several days after the crisis. Patients in whom the nervous symptoms are pronounced, as in the case of alcoholics, and those in whom the condition of the heart gives some concern, may sit up in a Morris chair for five to six hours daily.

The sitting posture relieves the pulmonary circulation and the right heart, the movements of the diaphragm are facilitated and the lung is enabled to expand in a downward direction.

The patient should wear light clothes and a bed pan must be used. The sickroom should be light, airy and cool. A nourishing fluid diet should be arranged, and cool drinking water should be offered to the patient at frequent intervals. It is good practice to isolate the sick one and to burn the sputum and disinfect urine and stools.

The nasopharynx should be kept moist and free by means of a spray of salt water or benzoinated albolene. An initial dose of calomel (gr. x, 0,6) followed by a saline cathartic will clear out the bowels, and a few drops of dilute hydrochloric acid in water given several times a day will aid digestion and prevent a foul coating of the tongue.

Specific Treatment (*Specifics and Semispecifics*).—Pneumonia Antitoxin (Serum).—At the Rockefeller Institute a tentative division of pneumococci into four groups has been suggested—the first and fourth groups representing the milder forms of the disease. Favorable results are reported in cases embracing the first group following the use of 100 c.c. of immune serum injected intravenously, and repeated every twelve hours if necessary.

It takes eight hours to determine by culture the character and organism of the infection, whereupon the proper serum may be employed. The serum is now on the market.

Vaccine Therapy.—Vaccine treatment is based upon the theory that the injection of a proper vaccine causes the production of an active im-

munity to the corresponding infection. It stimulates the body to increased production of opsonins and antibodies and therefore is a proper scientific treatment, for it is a direct imitation of nature's methods. Recovery from a pneumonia involves the destruction of the invading pneumococci and the neutralization or elimination of the endotoxins set free by the disintegration of the pneumococci. This is just what a vaccine assists the body to do. In addition, the injection of a vaccine increases the production of leukocytes, thus adding reënforcements to nature's forces.

Fig. 117.—Lobar Pneumonia with Symmetrical Ecchymoses.

An autogenous vaccine, that is, one made from the patient's own particular infection, is naturally better than a stock vaccine, for there are many varieties of the pneumococcus.

The keynote of the treatment of pneumonia by vaccines is *early administration.*

Autogenous Vaccine Therapy.—It takes about three days to properly prepare an autogenous vaccine from the sputum. One c.c. of the fluid usually contains from 100 to 500 millions of cocci. The initial dose is two-tenths c.c. to be increased by one-tenth c.c. to full dose. Injections are to be given every other day subcutaneously in the arm with all aseptic precautions.

Stock vaccines have been in the market for some time.

Hiss Leukocyte Extract.—This preparation is supposed to increase leukocytosis; it is injected subcutaneously.

This method of treatment is in the experimental stage, and no definite statements regarding its value can be made.

Quinin Urea Treatment.—Specific antiseptic virtues are claimed for this drug. The combination is prepared as follows:

℞	Quinin muriat	3i	4,0
	Urea	gr. xv	1,0
	Aquae destil.	3v	20,0

Sig. Inject 20 drops subcutaneously every four hours.

A sterile solution is now obtainable in ampules.

Camphor in Pneumonia.—From 20 to 30 drops of a 20 per cent sterile solution of camphor in oil is injected subcutaneously every two

hours until eight doses have been given. A second series of injections can be administered after an interval of one day, and so on until the crisis.

Under the camphor treatment many severe cases of pneumonia pull through. It may be employed alone or in combination with digitalis, or it may be given along with serum and vaccine therapy.

Dr. A. Seibert of New York recommends very large doses of camphor in the treatment of pneumonia:

A thirty per cent preparation of camphor in oleum sesami should be used, which can readily be prepared by the local druggist. The physician should always see to it that the solution is of full strength and absolutely sterile. In preparing the remedy the oil to be sterilized should be put in a wide-mouthed bottle having a loosely fitting stopper, the sterilization taking place in a boiling water bath. Whenever the preparation is to be used it should be drawn (not poured) into the sterilized syringe, care being taken to prevent loss of camphor by volatilization. As soon after the initial chill as possible, 10 c.c. or two and one-half drams (equal to 36 grains of pure camphor) to 100 pounds of human body weight should be injected hypodermically. This dose should be repeated every twelve hours, except in bilateral pneumonia and in severe toxemia. In those cases the injections should be given every six to eight hours.

The syringe used should be a Luer, without rubber washers, of 10 to 20 c.c. capacity. The site selected for the injection should be the outer thigh or the abdomen. The point at which the injection is to be made should be carefully sterilized by thorough washing and the application of tincture of iodin. The injection should be made slowly and the oil gradually deposited below the subcutaneous fatty tissue and not into it. If these simple precautions are carried out there will be no trouble either in the form of abscess, sloughing of the skin or immediate discomfort following these injections.

The camphor treatment is also adapted for pneumonia in children (dose, gtt. v to xv of a 30% solution of camphor in oil).

Creosote Inhalations.—The internal administration of creosote preparations is a favorite routine therapy in pneumonia. Whether or not this form of treatment is actually helpful is not definitely established.

Creosote preparations, according to the writer's experience, take away the appetite for nourishing food. If creosote is to be used at all it should be administered in the form of inhalation by means of the croup kettle.

Treatment of the Soil in Which Pneumonia Develops.—In the management of infectious diseases we have not alone the *seed* (the germ), but we also have the *soil* to take into consideration. The clinical course of a pneumococcus infection will vary somewhat according to the nature of the soil in which it is cast.

Individuals with chronic syphilis or with chronic malaria, who contract an acute pneumonia, will respond more promptly to well directed

treatment if *iodid of potassium* or *quinia* is given in doses sufficient to neutralize the soil. This suggestion is of practical importance and should not be overlooked in arranging the details of therapeutic management.

Symptomatic Management.—Pain is relieved by applying an ice bag or hot-water bag over the seat of pain. If the pain is very severe a hypodermic injection of one-sixth of a grain of morphin is helpful.

Fever.—The most rational procedure in hyperpyrexia with cerebral

Fig. 118.—Cold Compress in Pneumonia (Baruch). (Courtesy of J. P. Lippincott and Co.)

unrest is hydrotherapy. In many instances cooling sponge baths will materially add to the comfort of the patient.

Whenever the temperature rises above 104° F. the chest compress should be applied, as shown in the illustrations, the compress being wrung out of water at 60° F. Such application may be renewed every hour or two according to indications. Cold compresses are known to reduce blood pressure and to increase leukocytosis.

Feeble children with a poor circulation and cold extremities are more apt to profit by a warm bath at 95° F. than by any form of cold water treatment.

Insomnia.—When cold compresses are employed a single dose of phenacetin (gr. v to xv) at night will usually bring on a few hours of restful sleep. Antipyrin in 3 to 10 grain doses is also attended with good results.

Delirium.—In active delirium which does not subside after the employment of hydrotherapy, combined with the administration of sedatives,

spinal puncture may be performed and the cerebrospinal fluid, which is usually under pressure, should be allowed to flow until it stops running.

Cough *and* Expectoration.—Cough is nature's effort to expel secretions. An incessant and painful cough robs the patient of much needed rest and sleep. In many instances the cough takes origin in the nasopharynx, and the nasopharyngeal douche or toilet, together with the benzoinated albolene spray, will reduce the frequency and severity of the paroxysms. If a harassing cough does not subside, however, it may be-

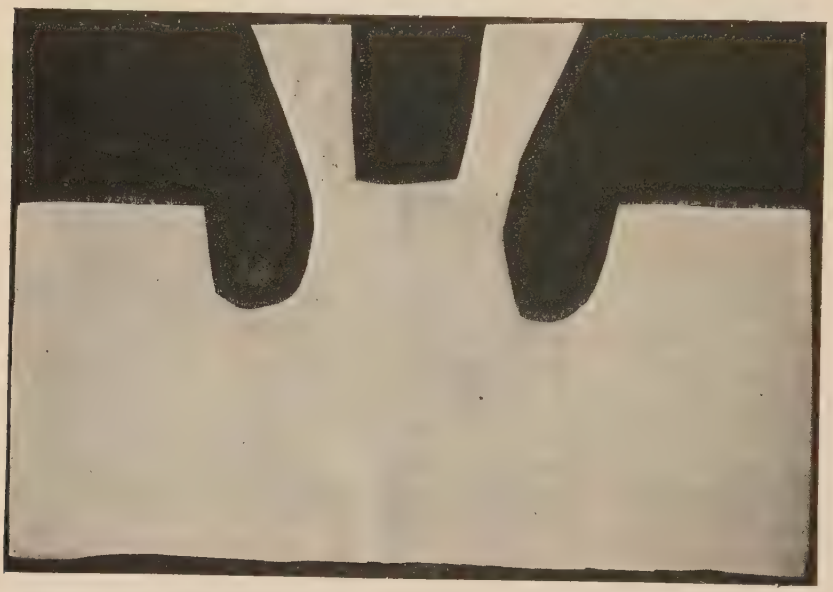


Fig. 119.—Cold Compress in Pneumonia. Shape of compress (Baruch). (Courtesy of J. P. Lippincott and Co.)

come necessary to give heroin (gr. 1/10) several times during the day or night.

Children may have from five to fifteen drops of paregoric as a sedative.

Profuse and free expectoration is usually desired and does not call for any treatment. When the cough is dry we may loosen up the secretion by a few five-grain (0,3) doses of potassium iodid at four-hour intervals and by inhalation of creosote from a croup kettle containing boiling saline solution.

Retention of Urine.—In adults as well as in children retention of urine is not infrequently observed. The complication must not be overlooked and requires catheterization.

Constipation.—Constipation is readily overcome by soapsuds enemata.

Weakness and Exhaustion.—A feeling of weakness and exhaustion is a danger signal for which alcohol, whisky, wine, champagne, and strong coffee are needed. Equal parts of whisky and tincture of digitalis given hypodermically (gtt. xxx, 2,0) each hour or two, is helpful.

Fig. 120.—Cold Compress in Pneumonia (Baruch). (Courtesy of J. P. Lippincott and Co.)

Impending Circulatory Failure—Collapse.—Pulmonary edema is treated by the administration of the following:

Camphor in oil	gtt. x-xx	0,6–1,2
Fl. extr. digitalis	gtt. ii-v	0,12–0,3
Caffein sodium benzoate	gr. v	0,3
Strychnia	gr. 1/30	0,002

These should be given by hypo every hour or two in alternation. At the same time enteroclysis should be done with a hot saline solution at 110° F.

When the patient is cyanotic, venesection (℥x to xx) is indicated. Oxygen inhalations by the Meltzer apparatus or the Meltzer hollow tongue depressor may be of value if given early.

Convalescence.—To guard against fatal heart weakness, a pneumonia convalescent should remain in bed for a week after the local process has terminated. A change of climate, if it can be secured under favorable surroundings, is desirable for a reasonable period.

Bronchopneumonia, Catarrhal Pneumonia

Definition and Etiology.—An acute catarrhal inflammation of the bronchioles and alveoli of the lungs, characterized by fever, cough, dyspnea, copious expectoration and great depression. It may be due to an extension downward of a bronchial catarrh, or it may follow one of the infectious fevers, especially measles, influenza and whooping-cough. The affection is observed most frequently in childhood and old age.

Prophylaxis.—Most important, in point of prophylaxis, is the giving of careful and early attention to every attack of bronchitis in infants, children or old people, for every such attack should be regarded as a possible precursor of bronchopneumonia. During convalescence from measles and whooping-cough children should have fresh air day and night.

Catarrhal troubles of the nose and throat should be carefully attended to. During fevers the mouth should be washed two or three times a day with an antiseptic solution (*see* Nasopharyngeal Toilet, Section I).

In conducting anesthesia, in feeding intubation cases, post-diphtheritic paralysis cases, or in feeding comatose patients, etc., every precaution must be observed to prevent aspiration pneumonia.

Physicians should guard themselves against contact infection from patients. Contact infection from sick animals, horses, dogs, cats, etc., should also be guarded against. All prophylactic measures discussed under Lobar Pneumonia apply to bronchopneumonia as well. Children under hospital treatment for gastro-enteric disturbances should be discharged from the hospital ward as soon as feasible.

Dr. D. W. Park, Director of Laboratories, Department of Health of the City of New York, recommends the use of a prophylactic vaccine containing the organisms of types 1, 2 and 3 pneumonic.

Principal Clinical Forms of Bronchopneumonia.—

Simple Bronchopneumonia.

Bronchopneumonia complicating pertussis and infective fevers.

Bronchopneumonia complicating diphtheria and croup.

Bronchopneumonia and chronic syphilis.

Bronchopneumonia and chronic malaria.

Bronchopneumonia in asthma and emphysema.

Bronchopneumonia in progressive cachexia.

Aspiration Bronchopneumonia.—Bronchopneumonia from irritating vapors and gases and foreign bodies and injuries of the lung.

Bronchopneumonia with and without areas of consolidation.

Bronchopneumonia and bronchiectasis.

Bronchopneumonia in aspergillus and actinomycosis of the lung.

Treatment of Bronchopneumonia.—The general management of a bronchopneumonia patient regarding bed rest, diet, fever, pain, cough, expectoration, bowel action, and insomnia, is practically the same as in lobar pneumonia.

Fresh cool air to breathe is the essence of good management in all forms of pneumonia, with plenty of water to drink and the nasopharyngeal toilet and albolene spray to keep the nose and throat from becoming dry. The best routine medication is dilute hydrochloric acid given several times a day to aid digestion.

Fever.—The normal range of temperature in bronchopneumonia is from 101° to 104° F. This temperature is not in itself exhausting, and the chances of recovery are not improved by systematic efforts at reducing it so long as it remains within these limits. The use of antipyretic drugs is to be absolutely condemned. They are even more dangerous in this disease than in lobar pneumonia. If the temperature is so high as to be dangerous in itself, it may be controlled by cool or tepid spongings, with gentle friction; by the use of cool cloths to the forehead, or an ice bag applied to the head if cerebral symptoms are marked.

Cold compresses around the chest renewed every hour or two are helpful in reducing fever and blood pressure. Children should have a warm bath morning and evening. Cool compresses around the chest are also very serviceable. Very high temperatures with marked cerebral symptoms may warrant the administration of a *single dose* of phenacetin or antipyrin at night.

Delirium.—The management of active delirium is the same as in lobar pneumonia.

Cough.—Again we should realize that the purpose of a cough is to empty the bronchi of accumulated secretions and is to be interfered with only when the cough is purposeless and exhausting. In such cases codein or heroin in proper doses may be administered and discontinued as soon as the cough ceases to be distressing.

Children may have from five to fifteen drops of paregoric if the cough prevents them from sleeping.

Expectorants are indicated, as in ordinary bronchitis, but not during the first few days of the infection. Probably the best general expectorant is liquor ammoniae anisatus, which is made up as follows:

℞	Ol. anisi.....	gtt. xv	1,0
	Spir. vini.....	ʒvi	24,0
	Aq. ammon.....	ʒi gtt. xv	5,0

Dose. gtt. i-x in sugar water.

Other serviceable expectorants are:

℞ Potass. iodid..... 3iiss 10,0
Liq. ammon. anis..... 3iiss 10,0
Aquae 3v 20,0
Sig. 20 drops every 3 to 4 hours in sugar water for adults; 5 drops for a child.

℞ Pulv. camphorae..... gr. ii 0,12
Pulv. digitalis..... gr. ii 0,12
Acid. benzoic..... gr. v 0,3
Sig. One such powder every 4 hours in milk (for adults).

Camphor in oil is a powerful expectorant in from 1 to 5 grain doses administered hypodermically every three to four hours.

Stimulants.—If we appreciate that the toxemia, delirium and cardiovascular failure are much less likely to occur with the open air treatment than otherwise, it will probably not be necessary to stimulate all cases of bronchopneumonia. Whisky, strychnia, camphor, caffein, sodium benzoate, enteroclysis with saline solution at 110° F., are reliable forms of stimulation.

Circulatory failure in the aged is in the vast majority of instances vasomotor failure, and calls for vasomotor stimulants. Some member of the digitalis group is here indicated; either in the form of the tincture twenty to thirty minims three or four times a day, or if the case be urgent one-half milligram of strophanthin intramuscularly followed with the doses mentioned of digitalis.

At times it is difficult to determine whether the heart is or is not involved in the circulatory disturbances. In such cases it is better to give caffein in the form of a soluble salt, as sodium benzoate—five grain doses at four hour intervals, or camphor in oil (ten per cent) in five grain doses at four hour intervals, or at two hour intervals, or alternate them.

Cyanosis.—Marked cyanosis is an indication for venesection. Adults may lose from 10 to 20 ounces (300,0 to 600,0) of blood. Children do not as a rule require venesection, but if it is decided upon not more than five ounces (150,0) should be withdrawn.

Specific Treatment.—In view of the fact that the flora of bronchopneumonia is usually complicated, the only feasible specific antibacterial remedy is an *autogenous vaccine* prepared from the patient's secretion or blood. In mild forms of bronchopneumonia vaccines are not required. In cases with severe symptoms with the prognosis *in dubio,* an autogenous vaccine should be prepared, if the facilities for its manufacture are at hand, and should be given as directed under Lobar Pneumonia.

Stock vaccines are in the market and good results have been reported

following their use. Quinin urea is supposed to have specific virtues; its formula and dosage are given under Lobar Pneumonia.

In diphtheritic bronchopneumonia with marked dyspnea and cyanosis the specific value of *diphtheria antitoxin* should be called upon, and in bronchopneumonia in luetic or malarial subjects *iodid of potassium and quinia* are valuable specific allies in the therapeutic campaign.

Foreign Body Pneumonias

At the meeting of the American Pediatric Society, held May 25, 1915, the author reported several cases of foreign body pneumonias which had

FIG. 121.—FOREIGN BODY PNEUMONIA. Nail in lung six weeks. Removed through bronchoscope.

been sent into the hospital as cases of unresolved pneumonia without a foreign body history.

In Case I the spasmodic character of the cough, the expectoration of pus in an acute lesion, in the absence of amphoric breathing such as we find in cavity formation, gave rise to the suspicion of a foreign body irritation. The röntgenogram revealed a large tack, with a large round head,

in the right lung. Rapid improvement followed the removal of the tack with the aid of the bronchoscope guided by the fluoroscope. The physical signs cleared up, and the child was discharged cured. The tack had been lodged in the lung about five weeks. In the second case the röntgenogram showed a large nail in the left bronchus and partly in the trachea. A lower tracheotomy was performed and the nail removed with the aid of the bronchoscope. In the third case a shawl pin was found in the left bronchus

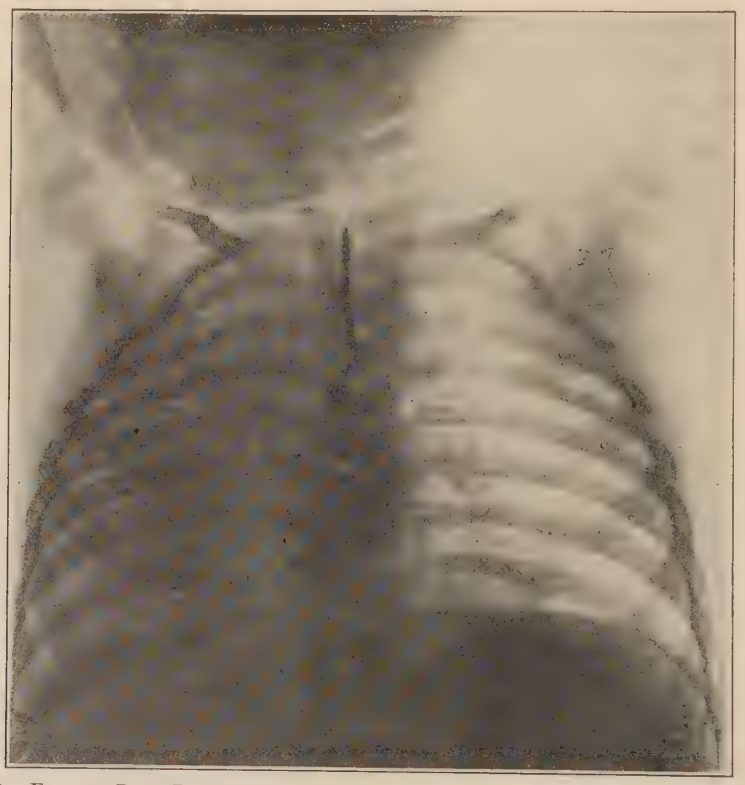


FIG. 122.—FOREIGN BODY PNEUMONIA. Nail in lung one year. Tracheotomy. Bronchoscopy. Removal.

and lung, the point projecting at the bifurcation in the trachea. During a severe spasmodic coughing spell the patient coughed up the two and one-half inch long brass shawl pin. The pin had been in the child's lung forty-three days without inducing local inflammation.

Young children have a habit of putting things into the mouth, and not infrequently we encounter cases in which foreign bodies, such as whistles, coins, safety pins, etc., are retained in the gullet or in the upper respiratory tract.

Mothers and nurses in many instances have a habit of holding safety and stick pins in the mouth, thus teaching this dangerous practice to their

children by suggestion. As a rule, patients are brought to the physician with a foreign body history, and with well-known acute symptoms.

In two of the cases here presented neither the mother nor the family physician suspected a foreign body as the cause of the pneumonia. Had these cases not been transferred to institutional care, with its modern equipment, in all probability both would have perished with a verdict of

Fig. 123.—Shawl Pin in Lung. Coughed out after an unsuccessful attempt at removal through bronchoscope.

death from pneumonia. Moreover, these cases show the great value of röntgenograms in diagnosis and the value of bronchoscopic methods.

The following deductions seem warranted:

(1) All cases of unresolved pneumonia and cases of pneumonia of atypical behavior should be x-rayed.

(2) All foreign body cases should be publicly reported in the lay press, as a warning to those having charge of young children to keep things out of reach and not to teach dangerous practices by direct suggestion.

Diseases of the Pleura

Pleurisy

Acute Pleurisy

Definition and Etiology.—An acute inflammation of the serous membrane which lines the thoracic cavity and its reflection over the lung. The inflammation is always the result of an infection by some pathogenic microörganism. It is seen as a secondary process in acute diseases of the lung, such as pneumonia. Tuberculosis, cancer, abscess and gangrene also cause pleurisy, when the surface of the lung becomes involved. In many cases, however, the inflammation of the pleura is a primary lesion, without any pathological change in the lung. In some cases traumatism is a provocative factor.

Clinical Forms.—Dry, Fibrinous and Plastic Pleurisy.—After persisting for a short time the characteristic friction sounds and the pain disappear and no exudation takes place. Adhesions between lung and costal pleura may develop and give rise to cracking friction sounds.

A dry pleurisy is often the first symptom of a tuberculous infection. A simple dry pleurisy admits of a favorable prognosis.

Effusive or Wet Pleurisy (Serous).—This form may develop insidiously or is ushered in by a feeling of chilliness and by pain.

Purulent Pleurisy.—Purulent pleurisy may develop as such or may be evolved from a serous effusion.

Hemorrhagic Pleurisy.—This form is met with in malignant fevers, in cancer, tuberculosis, nephritis, hepatic cirrhoses, etc.

Diaphragmatic Pleurisy.—This form may be dry or wet.

Chylous Pleurisy.—Chylous pleurisy may result from injury to the thoracic duct, from filariasis or from fatty metamorphosis of the epithelium.

Pulsating Pleurisy.—This form derives its name from the transmitted pulsations of blood vessels or the heart.

Encysted Pleurisy.—Encysted pleurisy is that condition in which adhesions separate the fluid into pockets, which may or may not communicate.

Prophylaxis.—The general hygienic measures outlined in Section III are the only rational preventive measures against pleuritic infection.

Treatment of Pleurisy.—The patient should have a hot foot bath and go to bed in a well ventilated room. The following initial dose should be taken at once:

℞ Podophyllin ..... gr. ⅓ 0,02
Calomel ..... gr. viiss 0,5
Quinia sulph..... gr. viiss 0,5
Pulv. aromat..... gr. iii 0,2
M. S. Take in wafer or gelatin capsule.

Without waiting for the action of this drug we apply a large turkish towel, wrung out of cold water, around the chest and cover the same with a layer of oiled silk. If the pain is severe an ice bag or hot-water bag may be applied over the seat of pain instead of the compress and a hypodermic injection of one-quarter grain of sulphate of morphia may be administered once, and repeated if necessary. Should this management fail to give relief 10 grains of sodium salicylate and three grains of potassium iodid may be given every three hours in lemonade.

The diet throughout should be *liquid* or *soft diet.*

When *effusion* is in evidence the aspirating needle will determine the nature of the fluid (*see* Bedside and Office Technic, Section I). If pus is found its speedy removal by incision, rib resection and drainage is indicated.

A *serous fluid* should not be removed at once unless dyspnea and heart action embarrassment are marked. The removal of a few ounces of fluid sometimes appears to start the absorption process. At this stage a *dry diet* and a brisk purge every other day are beneficial—warm baths and enteroclysis at 110° F., and the wearing of cool compresses over night also favor absorption. One tablet of iodotropon, morning and evening, may be administered for weeks. The *modus operandi* of chest aspiration is given under Bedside and Office Technic (Section I). After the removal of fluid respiratory gymnastics and blowing fluid from one bottle to another will expand the lung.

In many instances serous effusion should be left to nature.

Chronic Pleurisy

This may be dry or wet with massive adhesions and cystlike pockets. Occasionally the fibrous tissue becomes calcified.

Management.—The management is hygienic and symptomatic.

Hydrothorax

Hydrothorax is localized dropsy with a low specific gravity fluid. It may disappear when a lagging circulation improves.

In urgent dyspnea thoracocentesis is indicated (*see* Bedside and Office Technic, Section I).

Hemothorax

Blood may collect in the thorax from many causes: trauma, ruptured aneurism, ulcerating blood vessels, new growth, scurvy, purpura, etc. The treatment is symptomatic.

Pneumothorax

This is an uncommon condition; about 70 per cent of cases are of tuberculous origin.

Prognosis.—The prognosis is good when due to trauma.

Symptoms.—Sudden pain and dyspnea are the prominent initial symptoms.

Pneumothorax may be complicated by serous or purulent effusion.

Treatment.—The general treatment is symptomatic and directed to the underlying cause. Surgical intervention is to be considered in purulent cases.

For the dyspnea and pain a hypodermic injection of a full dose of morphin should be used. This drug is also valuable in preventing coughing, diminishing the respiration, and preventing the distention of the pleural cavity with air. Collapse should be treated by diffusible stimulants, such as ether, camphor, alcohol or ammonia, and the patient should be kept warm and absolutely quiet. The operation of thoracotomy often gives relief. Many cases are, however, better off if not interfered with surgically.

Benign Tumors and Cysts in the Thorax

Benign tumors and cysts in the thorax can be located more definitely than formerly with the aid of the röntgenologist. The thorax has become a field for exploratory incision and surgical therapy.

In obscure intrathoracic affections the possibility of a syphilitic lesion should not be overlooked and an antiluetic regimen should be instituted in doubtful cases.

Affections of the Mediastinum

Mediastinitis

Etiology.—Mediastinitis may be of traumatic or metastatic origin and may be due to extension of a neighboring inflammatory process (pleura, pericardium or esophagus).

Clinical Course.—Suppurative inflammation may extend from the neck along the large vessels; from the larynx and trachea; from the esophagus; from suppurating retropharyngeal glands in children; from suppuration in the lungs, thymus or bronchial glands.

Tuberculous inflammation extends from the vertebrae or lymph glands,

and is generally suppurative also. Metastatic mediastinitis has been found in typhoid fever and erysipelas.

In a large proportion of cases of mediastinal diseases the condition is one of abscess. These abscesses are apt to force their way through to the surface of the chest, and they have also been known to break into the trachea, esophagus, pleural cavity, pericardial sac, left ventricle and aorta.

Treatment.—Besides causal treatment, the management should be along the same lines as in acute inflammation elsewhere. If an abscess develops, it should be treated surgically, by free incision and drainage. Good results have been reported by resection of a part of the sternum.

Mediastinal Lymphadenitis and Abscess

Inflammation of the glands of the mediastinum may be simple or suppurative. In all inflammatory affections of the bronchi and the lungs the groups of lymph glands in the mediastinum become swollen and hyperemic, but generally subside with the primary infection. Those glands that suppurate and form abscesses are usually associated with tuberculosis. The pus should be removed either by aspiration or other operative intervention.

Mediastinal Tumors

The non-malignant tumors of the mediastinum are fibroma, teratoma, dermoid cyst and hydatid cyst. The malignant tumors are carcinoma and sarcoma. Of these tumors carcinoma is by far the most frequent.

Treatment.—Mediastinal growths are usually of such a nature as to be beyond either medicinal or surgical treatment. However, röntgen rays combined with Coley's treatment may be tried.

Again we should remember the possibility of a tumor being syphilitic, and if there is the slightest suspicion, it should be treated accordingly. Dermoid cysts and teratomata are sometimes operable.

Symptomatic treatment resolves itself into giving the patient the greatest possible comfort. But one drug will give relief from cough, dyspnea and pain in this fatal disease, viz., morphin.

Emphysema of the Mediastinum

Emphysema of the mediastinum is associated with pneumothorax or may follow tracheotomy.

Section IX

Cardiovascular Derangements—Dropsy and Effusion

General Remarks on Prophylaxis and Treatment of Circulatory Diseases

Prophylaxis.—Our advanced knowledge of the clinical pathology of the circulation (heart, blood vessels and circulating fluids) enables us to formulate some more or less definite rules in regard to prophylaxis and treatment of circulatory disturbances.

Great and continued expenditure of force is often followed by undue *hypertrophy of heart tissue* and eventually by *dilatation*. The heart, being a hollow muscle filled with fluid, may suffer temporarily or permanently by reason of undue and prolonged strain. Even in young persons, as in the case of children afflicted with severe paroxysms of whooping-cough, the strain upon the heart may bring on an enfeebled circulation. Thus, any well directed effort to lighten the strain of a severe paroxysmal cough may be of far-reaching beneficial result. In adults whose hearts and blood vessels have already suffered from the inevitable wear and tear of life, the avoidance of undue strain is of prime importance as far as the comfort and tenure of life are concerned.

Arteriosclerosis, syphilis and alcoholism, intestinal toxemia from high living, oral and gonorrheal sepsis, etc., are causative and avoidable factors of circulatory disturbances.

When arterial pressure from any cause whatsoever is markedly and permanently increased there is danger of capillary rupture with its various sequelae; therefore a timely readjustment of a faulty hygiene prevents untold misery and prolongs life.

Infections of all kinds are liable to permanently damage the circulatory organs as well as the circulatory fluids and as the nasopharynx and buccal cavity are the portals of entrance for many infections, careful attention must be given to diseased tonsils, adenoids, diseased ethmoidal cells and dental caries or sepsis.

From a clinical standpoint the blood may be looked upon as a tissue liable to become infected and to carry infection to all other tissues; on the

other hand a certain immunity to infection may be inherited, acquired or lost. Lowered resistance to infection and lost immunity demand hygienic living in its broadest sense.

The hemoglobin index of anemic individuals can be increased in a natural way without drugs, by a change of climate from the sea level to the mountains, or vice versa, and families who have drifted from the country to the city and lived there for several generations under unavoidably devitalizing conditions may acquire renewed vitality by immigrating into a better air and calmer environment.

Thus the modern family practitioner with opportunities for intimate knowledge of the traits of families and individuals plays an important rôle in society by *safeguarding his patients* as regards infection and its sequelae, by properly adjusting environment and life conditions *before* the seed of disease finds foothold in a *receptive soil.*

Treatment.—In circulatory inefficiency due to a *small, flabby* heart muscle or to obesity, anemia and neurasthenia, *active exercise* in fresh air is indicated. Oertel's terrain cure (hill and mountain climbing) and all kinds of physical exercises—walking, gymnastics, cycling, horseback riding—should be practiced; also deep breathing exercises. In obesity a special diet is indicated.

When heart and blood vessels are *structurally damaged,* mountain climbing and violent exercises are to be avoided. A *rest cure* with passive motions in bed or on a couch and massage should be adopted. Rest and the avoidance of worry, and an optimistic attitude of the physician in charge will often sustain the reserve power of the heart until compensatory equilibrium is attained. Even general and localized dropsy may completely disappear, particularly if digitalis and occasionally opium be administered.

When decompensation is pronounced, venesection will unload the embarrassed heart. Symptomatic treatment in the decompensation period will require our best efforts—particularly for the relief of dyspnea and insomnia. When cardiac dilatation is pronounced and the kidney secretion sinks and remains much below the normal, there is danger of dissolution. Progressive circulatory failure, secondary to severe renal inefficiency, is more difficult to combat than the primary form.

Summary.—The influence of a *weak heart* on the general circulation may be summed up as follows: When both sides of the heart are equally or unequally reduced in tone and power, we observe venous stasis with at first functional disturbance in the lungs, liver, kidneys, stomach, and brain, with their train of symptoms: dyspepsia, dyspnea, local pain, vertigo, palpitation, etc., with a terminal *dilatation* and *collapse of the heart.* Whereas a moderate *valvular defect* is of importance as regards *accommodation,* a *dilatation* has a serious pathological importance. *Venous stasis* give a well recognized clinical picture. Cyanosis and turgid veins, with and without pulsation of the jugular and other veins, cardiac dyspnea, and

hyperemia of the liver and lungs, with a tendency to catarrh and hemorrhage and fluid accumulations in dependent parts and cavities, are the components of venous stasis. Cardiac dyspnea is probably due to swelling and rigidity of lung substance from congestion.

Heart insufficiency, or *heart weakness,* may be due to muscular insufficiency or valvular insufficiency or to both combined.

It may be *primary* or *secondary* to other disease conditions which obstruct the circulation. This distinction has clinical importance, and if the underlying cause of circulatory weakness, or heart strain, can be removed, the heart may regain its integrity.

In dealing with the patient the terms *"weak heart"* and *"faulty circulation"* are preferable to the terms *heart disease* or *valvular heart disease,* from the humane standpoint. The *element of fear of sudden death* which we find in the laity when heart disease is spoken of plays an important part in the management of such cases, and the physician may be well aware of the exact anatomical nature of the disturbance without unnecessarily alarming and harming his patient.

Bearing in mind the influence of thought and emotion upon the heart, the tactful physician will endeavor to surround his patient with an atmosphere of optimism and hope. In many instances there is very little occasion for alarm and even in serious cases the optimistic attitude of the physician is the best heart tonic, inasmuch as it gives rest to the mind and also to the heart.

Remarks on the Clinical Pathology of the Circulation

An efficient circulation is of fundamental importance to the organism and depends upon the condition of the motor (heart) and the elasticity of the vessels. Vasomotor influence is exerted in such a manner that normally one organ may be hyperemic and another anemic without disturbing the general circulation. There is also an aspirating mechanism furnished by the right heart and the lungs, supplemented by the contractions of muscles and fasciae. Owing to a well recognized reserve power, the accommodation of the heart muscle to the various demands made upon it is very complete in health. Great and continued expenditure of force is followed by hypertrophy of tissue, just as in the skeletal muscles. Thus, any impediment to the circulation, be it located in lungs, kidneys, liver, or blood vessels, will put a strain primarily upon the left heart and produce hypertrophy, that is, more heart muscle, in order to overcome the resistance. The so-called reserve power in the heart is present in hypertrophic hearts as well as in normal hearts, although not in the same degree. When arterial pressure is permanently increased, there is danger of rupture of capillaries (on exertion), particularly in arteriosclerosis.

Unusual heart fatigue and heart strain may be followed by *distention*

or dilatation of the heart. Recovery from distention may take place sooner or later, but occasionally a heart is thus permanently damaged. Heart strain is particularly dangerous in chronic degeneration of the heart muscle or following acute infectious fevers, such as typhoid or diphtheria, and in pertussis, etc.

The Position and Size of the Heart.—These are made out by means of inspection, percussion, palpation, auscultation, and direct vision through the agency of x-rays. Such knowledge must be acquired at the bedside and cannot be learned from books. In transposition of the viscera the heart is sometimes located on the right side (dextrocardy). In a rachitic thorax the position of the heart is not normal as regards usual landmarks.

The lungs cover the heart and large blood vessels, excepting a part of the right ventricle. The area of the uncovered heart is called the area of superficial dullness; that of the whole heart, the area of deep dullness. The heart is movable. Thus, the apex beat and heart dullness will move to the left if the patient's body during examination tilts to the left side; and it does not always mean enlargement if the apex beat is to the left of the nipple. In many people no apex beat, or heart shock, is felt. The term *cardioptosis* is occasionally used in connection with a heart which by reason of a laxity of attachment is very movable.

In order to determine the borders of the heart, the lungs and pleura must be clear. The diameter of the heart is greater during forced expiration than during inspiration. The size and position of the heart and the decrease in size of a dilated heart improving under treatment may be observed by means of the Röntgen rays.

The *pulse* should be felt at both wrists to see if it is synchronous. Auscultation of the heart and examination of the pulse at the same time will distinguish between systolic and diastolic phenomena. The pulse may be slow, rapid, intermittent, arrhythmic, small, large, or trip hammer. An imperfect heart systole may manifest itself as an intermittent pulse.

Murmurs.—Regarding murmurs, it may be remarked that not all systolic murmurs mean a valvular lesion, and thus we speak of *accidental* non-pathological murmurs and of functional murmurs. We hear musical, rough, soft, blowing, scraping, and vibratory murmurs. In children accidental murmurs are comparatively rare.

Accidental heart murmurs are as a rule systolic and offer no direct indications for treatment, as they are not connected with organic changes in the valves, papillary muscles, or chordae tendineae.

Diminution of blood pressure and transitory disturbances of the motor function of the heart may cause temporary insufficiency of a valve and produce a heart murmur (*functional murmur*).

Pericardial friction sounds may be mistaken for heart murmurs. A murmur may make its appearance during illness and subsequently disap-

pear completely. Heart murmurs which disappear on holding the breath are of *cardiopulmonary origin,* and not endocardial.

When the heart beats rapidly, as in fever, heart murmurs may disappear or accidental murmurs may arise; therefore, heart sedatives may be given for *diagnostic purposes* to reduce the forcible and rapid action of the heart and bring out murmurs if present. A murmur that accompanies the normal heart sound is of less gravity than one that replaces it.

The pulmonic second sound is accentuated when there is pressure behind the valve, but such phenomena are also observed in the normal hearts of neurotic individuals.

Reduplication of the sound indicates that valve action is not simultaneous or is out of time, or that heart strain is present (nephritis). A reduplication of the first sound is frequently heard when there is high arterial tension, as in aortic stenosis or kidney disease.

The most satisfactory way of auscultation is the direct one. The stethoscope is an aid to the dull ear, however.

As the *size of the liver* and its *tenderness* are important guides to the degree of venous stasis, they should always be ascertained in connection with an examination of the heart, as also the examination of urine. When albumin and casts are found in heart insufficiency, it becomes important to know which is *primary,* the heart or kidney trouble. This may be ascertained by a careful weighing of all the evidence, and thus the treatment will be better directed.

In *heart weakness,* or *insufficiency,* a complicating hydrothorax is often present and overlooked. The removal of fluid from the thorax in cases of overwhelming heart strain is often followed by subjective relief and lasting improvement.

In children the heart beat is often rapid and occasionally intermittent, even in sleep, and the rapid pulse has not the same significance as in adults. A slow and irregular pulse, particularly following infectious disease, is of graver import in children and justifies a guarded prognosis.

In speaking of murmurs the author prefers to use the terms *systolic* and *diastolic,* not being convinced of any gain in clinical clearness by using the term *presystolic.*

In arrhythmia and in chronic myocarditis, a more exact prognosis can be formulated with the aid of the electrocardiograph.

Clinical Aspect of Hypertrophy and Dilatation

Enlargement of the Heart

Enlargement of the heart may be due to simple hypertrophy or dilatation or to hypertrophy and dilatation combined.

Simple hypertrophy of the heart is the direct result of heart strain on

a heart muscle not markedly degenerated, and it depends upon three factors: the duration of the strain, the degree of the strain, and the condition of the heart muscle.

Enlargement may affect the entire organ or one side or only one chamber.

The changes are most frequent in the left ventricle, because it does the principal work in pumping the blood through the body.

We speak of a primary, or idiopathic, hypertrophy when it occurs in neurotic individuals who have a continued rapid action of the heart or following the abuse of tobacco, beer, or prolonged heavy work (athletes) and in gravidity. Any strain upon a skeletal muscle makes it hypertrophic; it is just so with the heart muscle.

We distinguish eccentric and general hypertrophy. Idiopathic hypertrophy is a specimen of general enlargement.

Hypertrophy is frequently secondary to arteriosclerosis, nephritis, hepatitis, emphysema, pericardial adhesions, and valvular defects; in fact, any chronic obstruction to the circulation is followed primarily by hypertrophy which influences its function and ends in dilatation of the heart muscle.

In ordinary hypertrophy the heart weighs from 500 to 600 grams. Weights up to 1,500 grams have been reported, but they are rare.

Symptoms and Physical Signs.—Hypertrophy is a conservative process and often gives no symptoms, but frequently there is a sense of fullness, with flushing, headache, palpitation, and forcible shock without palpitation. In arterial degeneration with hypertrophy of the heart the development of miliary aneurism in the brain and cerebral hemorrhage are common. There may be bulging of the chest wall, the area of impulse is increased, and percussion shows increased dullness going to the left of the nipple. This may be absent, however, if hypertrophy increases the heart in the anteroposterior diameter. The pulse is full, strong, and of high tension in cardiac hypertrophy. Enlargement of the heart must be distinguished from mediastinal growths, neurotic palpitation, and hydropericardium. Chronic pneumonia and pleurisy on the left side, by reason of retraction, may "uncover" the heart and give rise to an extensive area of dullness, which may be mistaken for hypertrophy. The latter is difficult to make out in a deformed chest.

A strong, heavy impulse apex denotes hypertrophy. In pericardial effusion the heart shock is not visible and is not felt. The sounds are distant and muffled.

Cardiac hypertrophy is clinically divided into three stages: the period of development, the period of compensation, and the period of decompensation (acute and chronic by dilatation).

Prognosis.—Prognosis is a matter of retained compensation. Hypertrophy may be transient from transient causes, such as neurotic palpitation,

tobacco, and overexertion, and will require sedative treatment as with bromid of sodium and laxatives.

Hypertrophy and arteriosclerosis will require careful dietetic and hygienic management in order to prevent, if possible, apoplexy. Otherwise, hypertrophy should be looked upon as a conservative process of nature, and our therapeutic indications are directed to the underlying cause and to the prevention of dilatation of the hypertrophic heart muscle.

Dilatation of the Heart

High blood pressure and impaired resistance produce dilatation of the heart. Two varieties are recognized: dilatation with thickening and dilatation with thinning of the heart walls.

Sudden cardiac failure during exertion is due to dilatation of the heart or rupture of a valve. Hearts which have lost their tone from muscular degeneration (infectious fevers or valvular defects), if subjected to severe strain, are apt to dilate. In pericardial adhesions the heart is apt to dilate. Dilatation is the opposite of hypertrophy and causes heart weakness. Mental emotion is supposed to be one of the causes of idiopathic dilatation.

Physical Signs.—Diffused impulse, weak muffled sounds. Dilatation may be accompanied by a murmur, and the heart sounds may be absent. The pulse is small, weak, quick, and intermittent. On auscultation we hear embryocardia, or gallop rhythm. Murmurs formerly present may disappear and murmurs may set in and disappear as the heart becomes stronger. This is due to relative insufficiency, not to valvular lesion. One of the earliest signs of dilatation is an irregular and intermittent pulse.

Hypertrophy and dilatation are often due to overexertion and alcohol, as in heavy beer drinkers.

If during severe muscular effort the heart is strained to its utmost, as in mountain climbing, *acute dilatation* may result. A sense of distress is felt and a feeling of dyspnea, which may pass over after a day's rest or may reassert itself on the slightest exertion. We speak of such a person as "wind broken."

Dilatation of the right heart may be recognized by the location of the impulse, which is below or to the right of the ensiform cartilage. The apex beat may be absent on the left side. Pulsation to the right or left of the sternum in the second and third interspace is looked upon as an evidence of auricular dilatation.

Management.—The management of circulatory failure due to dilatation of the heart will be considered under the heading, Valvular Heart Disease in this section.

In *acute dilatation* from overstrain absolute rest in bed must be enjoined.

Congenital Defects

Children are born with divers heart lesions, such as patency of the foramen ovale, patency of the ductus arteriosus, defect in the ventricular septum, and lesions at the pulmonary orifice. Prematurity and syphilis seem to be etiological factors. Various defects may exist in combination.

Symptoms.—Cyanosis, dyspnea, cough, convulsions, edema, and great restlessness. In some cases murmurs or intermittent murmurs and an increase of the dull area of the heart are found on examination. In other cases the physical examination is almost negative; no murmurs are heard.

Treatment.—We are unable to cure an anatomical defect of the heart. When blue babies, by reason of constant suffering, cry day and night, it is necessary to administer a sedative, such as chloral hydrate and potassium bromid, to put the child to sleep, and use as occasion demands. Some of these patients die during infancy, others succumb to some intercurrent disease during childhood, and some grow to maturity.

In cases of open ductus arteriosus a humming top murmur is usually in evidence but the other signs of congenital heart disease, such as thrill, cyanosis and enlargement of the heart, are usually absent. The *ductus arteriosus* may close spontaneously or persist without grave symptoms or circulatory disturbance. Surgical intervention in patency of the ductus arteriosus is a possibility of the future.

Acute Circulatory Failure

Heart Strain—Shock—Collapse

A sound and a damaged heart may suffer acutely in various ways, viz.: from direct injury, embarrassment due to compressed or rarefied air, entrance of air into the right heart, embolism of the pulmonary artery, severe hemorrhage, shock or nervous depression, and the various septic and chemical poisons, anesthesia, mechanical obstruction to the heart's action from pericardial effusion. It is nothing unusual for a senile heart to come to a stop from shock or from the effects of an operation or from an attack of acute gastro-enteritis. A sudden heart death in convalescence following septic diphtheria is no uncommon circumstance.

The heart's nourishment depends so much upon its own proper function that any depressing circumstance which lowers the blood pressure in the aorta and coronary arteries may be of great moment. The rapidity with which sudden circulatory failure sets in gives the patient barely time to state his distress; consciousness fails, the face turns blue, the extremities are cold, the pulse fails, and death supervenes sometimes in a convulsive

seizure. In subacute cases the collapse passes over and the circulation under proper management gradually improves.

Treatment.—The treatment of acute collapse *is its timely prevention*, of which we shall speak under the management of the various diseases which provoke it. In cases of acute collapse in which death is not instantaneous the prompt attention of the physician may save life. Lower the head, loosen the clothes, employ artificial respiration, hold ammonia to the nose, give salt water hypodermically, per rectum or intravenously, or administer strychnin, camphor, whisky and digitalis internally or hypodermically. The gradual progressive insufficiency of the heart, noticeable in so many diseases, is best combated by absolute rest and such other measures as are discussed under their various headings (*see also* Section on Emergencies).

Endocarditis

Definition and Etiology.—Endocarditis is an inflammation of the inner (lining) membrane of the heart. Rheumatism or any other infectious disease may constitute the causative factor.

We distinguish acute and chronic endocarditis.

Acute endocarditis is recognized clinically as simple, malignant, septic, and verrucose. The simple form is one of the associated features of acute rheumatic fever, and is occasionally met with in scarlet fever, so-called tonsillitis, typhoid fever, pneumonia, and chorea.

Bacteria, the causative factor of infection, for some reason or other find a foothold on the endocardium, usually in the left heart, and the ensuing hyperplastic or destructive inflammatory process is very apt to result in permanent damage to the valves of the heart.

A somewhat similar but much severer form of endocarditis occasionally follows gonorrheal infection or gonorrheal rheumatism. The most fatal form is septic or ulcerating endocarditis, all forms presenting but different degrees of intensity of the same process, but possibly of different microbial origin. The lesions are vegetative, ulcerative, or suppurative, and the sequelae are embolism and infection of other tissues and organs.

There is nothing characteristic in an onset of endocarditis. When in the course of rheumatic arthritis there is an exacerbation of fever, with a rapid, unsteady heart, with or without increase of joint symptoms, endocarditis may be suspected. If, in addition, a murmur is now heard in a heart which was free before, we are very apt to diagnosticate endocarditis, bearing in mind, however, that accidental murmurs are heard over the heart during febrile disease, but may disappear and leave an intact heart. There may be sweating, chills, delirium, petechiae, and embolic processes, with the symptoms pertaining to them, such as coma, paralysis, local pain in

some other organ, bloody sputum, bloody urine, and retinal hemorrhage, or localized gangrene.

Some types of endocarditis, particularly the chronic form, *resemble irregular intermittent fever.* Others have the cardiac or cerebrospinal symptoms pronounced. Jaundice has been observed, also oppression and short breathing, cardiac pain, and great restlessness. Each case must be judged upon its own merits, and no definite general diagnostic landmarks are possible.

The acute septic form, which frequently terminates fatally, may complicate septicemia from erysipelas, puerperal fever and gonorrhea. The milder forms usually recover with a damaged valve. One of the great achievements to be hoped for in practical medicine would be the prevention of endocarditis in chorea, eruptive and other fevers, gonorrhea, tonsillitis, diphtheria, etc.

Prophylaxis.—Prophylaxis against endocardial infection is outlined in the "Summary of Prophylaxis" at the head of the section on Contagious Fevers.

Treatment.—Absolute rest, warm baths, cooling drinks, fever diet, an ice bag to the heart. In the septic form the management is the same as for any other sepsis, viz., elimination and stimulation. Treatment by vaccines and antistreptococcus serum is in its experimental stage.

In acute articular rheumatism with high fever, rapid heart, and pronounced restlessness, it seems rational to combine a heart sedative with sodium salicylate as follows:

℞	Sod. salicyl.	ʒii	8,0
	Potass. iodid.	ʒss	2,0
	Tinct. aconiti radic.	āā, gtt. x	0,6
	Tinct. verat. virid.		
	Aquae . . . . . q. s. ad	℥ii	60,0

M. S. One teaspoonful, with sugar, every two hours, for children; the dose for adults must be larger. Apart from internal medication, Credé's ointment may be rubbed into the skin, ʒi three times daily.

It is, furthermore, of the utmost importance that in the treatment of rheumatic cases routine flushing of the bowel with warm saline solution be practiced, in order to eliminate, if possible, the danger of intestinal toxemia or secondary infection from the enteric tract.

In *septic* and *malignant endocarditis* pyogenic organisms are found in the blood with occasional absence of auscultatory symptoms in the heart. Glandular enlargement without leukocytosis is common, also petechiae are observed. A focus of infection should be looked for.

Treatment of *malignant endocarditis* with cardiac stimulants, salicylates, stock vaccines, polyvalent (streptococcus) serum or blood transfusion

is usually unable to ward off the fatal issue. In Streptococcus viridans sepsis the author has known recovery to follow the intravenous administration of 20 grains of magnesium sulphate in 200 c.c. of water, or the intravenous administration of neosalvarsan. As an auxiliary measure collargol should be given by the Murphy drip method, 50 c.c. of a 40 per cent solution of collargol in 1,000 c.c. of saline.

Chronic Endocarditis

Definition and Etiology.—Chronic endocarditis is a slow, insidious process, secondary to acute endocarditis or superinduced by various irritants and infections, such as syphilis, gout, alcohol, and *malaria* or oral sepsis—together with prolonged muscular strain. This process results in thickening and contraction of valves, usually in the left heart. It may be observed in children and it is common in middle aged individuals. When the valves are affected and the heart's equilibrium is disturbed, the first complaints are heard, and subsequently the course and management are those of chronic valvular disease. Alcoholism, syphilis, malaria, and rheumatic infection are the predisposing factors. Syphilis and malaria require specific treatment and change of climate.

Prophylaxis and Treatment.—Persons living in unwholesome abodes must be told that sunshine, cleanliness, and fresh air are the best preventives against acute and chronic infection.

In cases which do not respond favorably to iodid of potassium, quinin, or to the salicylates or arsenic, vaccine treatment, blood transfusion or the intravenous administration of magnesium sulphate or neosalvarsan may be tried.

Pericarditis

Definition and Etiology.—Pericarditis is an infection and inflammation of the pericardium, usually secondary to an inflammatory process of a neighboring serous membrane. As in pleurisy, we have a dry pericarditis or one with serous or purulent effusion with and without adhesions. Rheumatism, all forms of sepsis, the eruptive fevers, Bright's disease, typhoid fever, diabetes, scurvy, and tuberculosis are provocative of pericarditis.

Pericarditis is not rare in children as a sequel of rheumatism or scarlet fever.

Dry pericarditis is recognized principally by its *friction sound,* to and fro, corresponding to the systole and diastole of the heart. This friction sound is superficial and close to the ear, and there are no definite lines of transmission, as in endocardial murmurs, although it must be admitted that occasionally it is difficult to distinguish a friction sound from a double murmur. Dry pericarditis is of limited duration, but it may persist and

result in a chronic thickening of both layers of the pericardium. There is no *typical* fever curve in this ailment.

Pericarditis with effusion may develop without characteristic signs, although precordial distress, pain on pressure over the heart, and dyspnea are the rational symptoms. Patients so afflicted have an anxious countenance with a paradoxical pulse, which becomes lost or faint during inspiration. These symptoms are the direct result of embarrassed heart's action. From pressure upon the trachea and esophagus we may have aphonia, cough, dysphagia, and venous stasis. Insomnia, delirium, and coma are observed in severe cases.

The *physical signs* of massive pericardial effusion are bulging of the chest and of the intercostal spaces, occasionally edema of the chest wall, diminution and obliteration of the cardiac shock, dislocation and loss of the apex beat, and an irregular, pear-shaped increasing heart dullness, with a broad downward base. With absorption of the fluid the friction sounds return. When an onset of pericarditis is suspected, the heart dullness should be carefully marked with a blue pencil. Pericarditis is often overlooked or mistaken for pleurisy.

Prognosis.—The prognosis depends upon the underlying cause and is favorable in the simple variety. Septic cases are usually fatal; the purulent variety not necessarily so, as the pus may be absorbed or is amenable to surgical interference.

Diagnosis.—It is sometimes extremely difficult to discriminate between dilatation of the heart and pericarditis with effusion. Cases occur in children in which it is difficult to distinguish between encapsulated pleuritic effusion and pericarditis and effusion, the needle showing a serosanguinolent fluid. Cases have been reported in which purulent pericarditis was mistaken for encapsulated empyema. The systole is not hindered in pericarditis with effusion.

Hydropericardium (*dropsy of the pericardium*) occurs in connection with general dropsy and presents the signs of pericarditis with effusion. *Chylopericardium* is a term used in cases of chylous effusion. *Hemopericardium may result* from rupture of an aneurism or from injury. *Pneumopericardium* may result from a stab wound, etc.

Prophylaxis against Pericarditis.—Apart from the general hygienic measures to be instituted in any and every infection little can be done to ward off pericardial inflammation. The timely removal of an accumulation of pus in adjacent parts may prevent the spread of an inflammatory process to the pericardium.

Treatment.—A stiff dose of calomel and jalap is appropriate at the start of almost any ailment. Rest in bed should be enforced. An ice bag to the heart or a blister or dry cupping is indicated. In adults complaining of severe pain a morphin injection over the seat of pain may be advisable. Credé's silver ointment (15 per cent of silver to one ounce of fat) may be

used to counteract sepsis. It is administered by inunction, 3i t. i. d.

If syphilis or malaria is suspected as an underlying cause, potassium iodid may be administered by the rectum, or a few doses of quinin may be given by the mouth. The salicylates are indicated when a rheumatic origin is the most plausible. The fewer drugs, the better for the patient. Five drops of dilute hydrochloric acid in sweetened water, after eating, will aid digestion. The diet must be light with plenty of water. Feverish patients generally enjoy a warm bath. In massive effusion, with severe pressure symptoms, *aspiration* may be necessary with subsequent incision and drainage if pus or seropus is found. The puncture should be made in the fourth or fifth interspace, one to one and one-half inches to the left of the sternal margin.

Suppurative pericarditis secondary to pleuropneumonia, empyema, osteomyelitis, and other septic processes, typhoid fever, influenza, trauma, etc., requires surgical treatment. The mortality is about 60 per cent. Resection of a portion of the fifth rib under local or general anesthesia is the proper procedure. Puncture is not sufficient.

Adherent Pericardium—Chronic Adherent Pericardium

Definition.—Pericarditis with adhesions which hamper the heart's action.

Symptoms.—Systolic depression of the intercostal spaces and fixation of the apex beat. In adhesions between the pericardium and chest wall the area of cardiac dullness remains the same on inspiration and expiration, and the heart is usually enlarged. Adherent pericardium may be universal or partial, following pericarditis of all forms. The symptoms are indefinite, although in children, with their flexible thorax, systolic retraction of the apex region with diastolic rebound and diastolic collapse of cervical veins is noticed. Accidental blubbering murmurs are also heard and the *pulsus paradoxus* is observed. Adherent pericardium is sometimes associated with a systolic retraction in the eighth or ninth interspace on the left side posteriorly (Broadbent's sign).

Treatment.—Nothing in the way of irritating restrictions should be inflicted on the patient. Apart from constitutional treatment nothing can be done. Cardiolysis (Brauer's operation) may be carried out in cases with urgent and distressing symptoms.

Muscular Insufficiency of the Heart

Weak Heart—Congenitally Small Heart—Flabby Heart Muscle—The Fat-Laden Heart—Cardioptosis

It is a well known clinical fact that some individuals have a small heart; thus, most people with tuberculosis or tuberculous tendencies have small

hearts. It goes without saying that persons not afflicted with tuberculosis may have a small heart. Such persons look anemic, are easily tired, and have palpitation on slight exertion, particularly if they increase in weight. These patients present all the clinical evidence of moderate heart insufficiency, and may show a slight puffiness at the ankles.

Diagnosis.—The diagnosis is made by exclusion. So-called "neurasthenic" heart weakness with its long train of symptoms is often nothing more than motor weakness.

Treatment.—An insufficient heart which will stand a strain will improve by reason of such strain and increase in motor force; therefore it is the duty of the physician to overrule the laziness and indolence of that class of patients whose heart symptoms are not due to degenerative processes by ordering *active exercise.* It must be explained to the patient that palpitation and moderate dyspnea do not contra-indicate active exercise. This must be particularly impressed upon corpulent women who feel faint, dizzy, and languid after exertion and are very prone to accept rest instead of motion. It is in this class of cases that graded climbing, outdoor and indoor exercise and gymnastics, and a judicious dietary will work wonders. The details of such management will be discussed below, under Fat-Laden Heart.

Weak heart from cardioptosis is described as a relaxation of the elastic tissue of the large vessels which allows the heart to prolapse, that is, hang much lower in the thorax than normal. This prolapse causes the apex beat to appear beyond the nipple line and makes the lower part of the area of relative and absolute heart dullness much wider than normal. The pathognomonic sign of the existence of this anomalous condition is the absence of heart dullness at the ordinary upper limit of the organ. As the result of the cardioptosis such symptoms as respiratory anguish, painful dyspnea, and precordial discomfort develop. Some of the cases of angina pectoris are said to be due to this condition. The cause is always an hereditary tendency to relaxation of tissues and seems to be a family trait. Apart from general tonic management there is no special *treatment* for such a condition.

The Fat-Laden Heart

(*Cor adiposum*)

Fat people frequently present the clinical evidence of heart weakness, and in the absence of a murmur, we are apt to diagnosticate "fatty heart." In all such cases we must endeavor to distinguish between fatty degeneration and the fat-laden heart of obesity. In obesity and fat-laden heart much can be done by rational management. Corpulent individuals are sluggish in their movements. They have dyspepsia from mechanical interference with respiration, later on from true fatty infiltration of the

heart muscle; the liver becomes large and fatty. Edema, intertrigo, and eczema increase the suffering of the patient.

Prophylaxis and Treatment.—The indications for treatment are reduction of the amount of food and oxidation of the fat already stored. *Persons who have a tendency to corpulency should be warned in time.* To reduce weight we have the Banting, Ebstein, Schwenninger, and Oertel systems (*see* Section I). The latter regulates diet and gives attention to the heart and circulation by systematic exercise, and is as follows:

FIG. 124.—CLUBBED FINGERS IN CARDIAC DISEASE.

Oertel recognizes two classes of cases: 1. Corpulency without respiratory and circulatory disturbance. 2. Corpulency with respiratory and circulatory disturbance. The oxidation of fat in the body is accomplished by massage, exercise in a gymnasium or in the open air, walking, mountain climbing, cycling, horseback riding, rowing, using the punching bag, playing tennis, etc. Turkish baths may be used, also the purgative waters of Carlsbad, Marienbad, Vichy, and Kissengen or their salts. Liquids should be restricted and none taken with a meal. Turkish baths and violent exercise are contra-indicated when the heart is damaged, as in the second class of cases. Walking is the best exercise, and climbing must be done gradually (terrain cure of Oertel).

Thyroid treatment, probably by increasing oxidation, has given good results in a number of cases of obesity. From 3 to 5 grains of the dry powdered gland may be given three times a day. Should palpitation and disturbance of the cardiac rhythm supervene, its use must be stopped, but dieting and exercise should be continued.

SPECIMEN DIET IN OBESITY AND CARDIAC INSUFFICIENCY

A. M.—Six ounces of coffee or tea, 3 ounces of bread.

NOON.—Eight ounces of meat or fish of any kind, salad, vegetables (2 ounces), fruit (3 to 6 ounces), bread or pudding (3 ounces); wine for those who are accustomed to it, but no beer.

EVENING.—Two eggs, ham or raw meat (4 ounces), bread, cheese, salad, fruit, tea or coffee.

Water is to be taken *between* meals. The diet should be generous as to variation. The menu should be liberal in quality, but the quantity should not exceed *2,000 calories*. One should eat one-third less than under ordinary circumstances and not attempt to reduce fat by a special kind of food. The same rule holds good for children. In corpulency with the muscles or valves damaged, and as the consequence, congestion in various organs or in arteriosclerotic changes, the greatest care must be taken in advising exercise. The physician must feel his way, so to say, and not force the patient into a regimen which may bring him into danger from bursting of a capillary vessel or from acute dilatation of the heart. Good common sense will direct the management, which can only be outlined in the absence of a specific case. The total daily amount of water should be limited to from 36 to 48 ounces (including tea, coffee, and wine), except in very hot weather, when more can be taken. Sweets of all kinds are to be avoided as much as possible.

Chronic Degeneration of the Heart Muscle Not Due to or Associated with Valvular Defects

Various terms are used to designate such condition, viz.: *senile heart, gouty heart, syphilitic heart, myocarditis with constant arrhythmia, fatty degeneration, fibroid heart,* etc.

Any acute infection, such as diphtheria, typhoid or rheumatic fever, scarlatina, etc., may be the starting point of the chronic inflammatory process in the heart muscle. Chronic infections, such as syphilis, malaria, and oral sepsis, are causative factors; and gout, diabetes, atheroma, alcoholism, pernicious anemia, chronic intestinal putrefaction, toxemia, and overwork are frequent causes. In fact, any nutritional change which blocks up the blood supply of the heart may result in softening and degeneration of the heart walls. The chronic form generally supervenes upon sclerosis of the coronary arteries. They are terminal arteries, and become blocked with a gradual onset.

Anatomically we observe induration, softening, calcareous, hyaline, fatty, and amyloid degeneration with general or localized dilatation. Clinically we cannot distinguish one form of degeneration from the other, their symptoms being alike.

Symptoms of Muscular Degeneration of Whatever Nature.—Dyspepsia; palpitation; precordial distress; arrhythmia; anginoid, syncopal, apoplectic, or epileptoid attacks; a short, unsustained, rapid, or regular or irregular pulse; cold extremities; dropsy; and great weakness. The heart eventually dilates, and a murmur may be heard, due to ventricular dilatation. Sudden death after a full meal is not infrequent.

The area of the heart dullness may be normal unless degeneration has affected a hypertrophic heart. Attacks of aphasia often present themselves when sclerosis is present.

The Senile Heart and Arteriosclerosis

In late life and without any history of previous disease, the heart is often found enlarged, and an active or relative weakness of the myocardium is the origin of the symptoms of the senile heart, such as precordial anxiety, unstable action, weak impulse, intermission of the beat, subjective throbbing, cardiac asthma with and without exertion, tremor cordis, fluttering, loss of appetite, fainting, a feeling of weakness, albuminuria, and a feeling of insecurity.

Senile diseases are always degenerative and tend to abridge the natural term of life, and our object is to relieve symptoms and check decadence. Senile cardiac failure is based upon impaired metabolism.

Prognosis.—We cannot cure this condition after it is well established, but by careful management we may prolong life for an indefinite time. A person with myocarditis may drop dead suddenly or live for many years.

Prophylaxis and Treatment of Chronic Degeneration of the Heart Muscle

Prophylaxis.—Prophylaxis against chronic degeneration of the heart muscle is fully described under Arteriosclerosis and Hypertension.

Principles of Treatment of the Various Forms of Chronic Muscular Degeneration.—The patient must be moderate in eating, drinking, and exercising. No special diet is necessary (except in obesity). The food should be plain and whatever the patient may like, *except* Swiss cheese, pork (lean ham allowed), roast goose and duck, fatty sausage, pastry, rich dishes, as well as cabbage, peas, white beans, string beans, and lentils. Beer should be forbidden as apt to produce flatulence and indigestion. There should be five hours between meals, and the main meal should be in the middle of the day. Fluids should be taken sparingly between meals. A little whisky in water is rather beneficial. Ginger ale is a good drink. Five to ten drops of dilute hydrochloric acid in water after meals will aid digestion. The patient may rest before and after eating. A mild smoke is not objectionable. The bowels should move daily. General massage is advisable. Venesection is often of great value. A warm, cleansing bath may be taken as often as necessary.

Of drugs the iodids rank first as remedial agents:

℞ Potass. iodid..... ʒii 8,0
Aquae cinnamomi..... ʒiv 15,0
F. solut.
Sig. Five to fifteen drops twice a day between meals in sugar water or in Seltzer water.

After taking potassium iodid in above doses daily for two weeks a single dose of from five to ten drops may be taken daily over a longer period. *Iodotropon* is also a valuable drug in this class of cases. One to two tablets should be taken daily for weeks and months.

Heart insufficiency due to syphilis belongs to the group. There are no special pathognomonic symptoms in heart syphilis; early symptoms are not pronounced. Its prevention is more readily accomplished than its cure. When the usual subjective symptoms bring the patient to the physician and anamnesic data point to an underlying syphilis as a causative factor of myocardial weakness, an antiluetic regimen must be instituted. It is in this class of cases that *potassium iodid* is powerful for good. As the heart's action is increased and depressed by nervous influence, it is unwise to worry the patient by keeping him constantly under strict supervision. Sajodin may be given instead of potassium iodid.

Bed rest in all forms of cardiac insufficiency is of the utmost importance for the successful management of a case. The patient should rest for days and weeks if necessary in a well ventilated room and take exercises without exertion by means of massage and passive motions. In *cardiac unrest* with *insomnia* from 10 to 20 grains of bromural should be administered with a view of inducing a few hours of quiet and restful sleep.

Neuroses of the Heart

Disturbances of presumably neurotic origin, independent of central nervous disease or valvular lesions, are very common. For all such neuroses we have special clinical terms, and we speak of *palpitation, arrhythmia, tachycardia* (*delirium cordis*), *bradycardia,* and *anginal attacks.* The source of such clinical phenomena is not readily located. Palpitation and arrhythmia may be perceptible to the patient or only an objective symptom, particularly at times when there is an increased excitability of the nervous system, at puberty and the climacterium and at the time of menstruation. Heart palpitation may set in suddenly from fright and emotion (fire, fear of death, dreams), lasting all the way from a single attack to recurrent daily attacks, extending over one to three years. In neurasthenics the slightest cause will send the heart up to 150 beats, with a feeling of "goneness," dyspnea, and a pallid countenance. On the other hand, arrhythmia may disappear after exertion even in valvular lesions.

In all obscure neuroses of the heart which apparently do not improve by diet and by physical methods of treatment the patient should receive the benefit of the doubt and undergo a mild course of antisyphilitic or antimalarial treatment.

Simple Palpitation and Irritable Heart

In simple palpitation the examination of the heart is usually negative. In neurasthenics and anemics a murmur is frequently heard.

Prognosis.—The prognosis in simple palpitation is good. Occasionally a patient with what is thought to be simple palpitation will develop some organic heart lesion.

Treatment of Simple Palpitation.—The patient must be told that he has simply a nervous heart and that the exercise of will power will overcome nervousness. The bowels should move once a day, and dilute hydrochloric acid (gtt. v to x) may be given in water once a day to aid digestion. The diet should be liberal, but the following articles should be avoided: beans, mayonnaise dressing, fried oysters or fried fish, and anything apt to produce flatulence. Alcohol, tea, coffee, and tobacco usually aggravate the neurotic heart to palpitation, but there are exceptions to this rule, and the wise physician will individualize regarding such restrictions.

Cool sponge baths, cold to the heart region, massage, walking, bicycling, punching-bag exercise, and horseback riding are indicated, also moderate up-hill walking, a change of scene, comedy, and light literature for the morbid. Static electricity and vibration treatment will aid in overcoming palpitation, and women with a lax abdomen and some degree of organ displacement (enteroptosis) should wear a support or binder.

In the way of drugs, bromid of sodium may be given in ten to thirty grain doses twice a day. The underlying cause of palpitation, be it obesity or indigestion or neurasthenia or anemia or exophthalmic goiter or brain disease or cardiac or renal insufficiency or respiratory insufficiency or sexual excitement, must be investigated. When we have a clear picture of simple neurotic palpitation or palpitation symptomatic with reference to other complaints, we shall know how to treat it.

Arrhythmias of the Heart

Pulse tracings and polygraphic and electrocardiographic tracings are essential for an exact study of cardiac arrhythmias. To the old clinical nomenclature of arrhythmias a number of new terms such as *sinus arrhythmia, extrasystole auricular fibrillation* have been added, but the practical gain particularly in regard to treatment is not yet noteworthy or pronounced except as laying down more exact indications and contra-indications for the administration of digitalis.

Arrhythmia of the heart may occur normally as an expression of the influence of respiration upon the heart (in sleeping children). The dropping of a beat is common in cases of senile heart, coffee heart, and tobacco heart, and particularly in cases of heart muscle degeneration. The fetal

heart rhythm is indicative of dilatation of the heart. Tremor cordis (fluttering of the heart) and gallop rhythm occur in arteriosclerosis. Thus, we may have temporary or transient and habitual arrhythmia, which is described by the patient as a sudden spasm giving rise to a disagreeable sensation.

We find disturbance of rhythm from many causes, e. g., from organic heart disease and from the abuse of tobacco, coffee, tea, alcohol, and digitalis. We find it in chlorosis, in syphilis and malaria, in gastro-intestinal putrefaction, in intestinal, hepatic, or renal colic, in urogenital ailments, in disease of the brain and cord or of the cardiac plexus, and from great mental worry or great fatigue.

The significance of arrhythmia is occasionally difficult to determine and depends entirely on the underlying cause. It may persist for many years in individuals who are apparently in fair health. Arrhythmia may be true and false. In the former the heart beat is actually dropped; in the latter the heart beat is regular, but the pulse is dropped.

Sinus Arrhythmia

Sinus arrhythmia is a frequent form of heart irregularity due to vagus action on the sino-auricular node—the pacemaker of the heart, as it is called. It is characterized by irregular long diastoles with pulse beats of equal force. It occurs mainly in febrile disturbance of children and young adults and in various forms of anemia.

Treatment.—When anemia is the causative factor, iron or arsenic are indicated. Recovery from this form of arrhythmia is usually complete.

Extrasystoles

Extrasystole or premature contraction may occur in organically sound hearts. It is characterized by an intermission on very faint pulse beat, due to a weak contraction, sometimes accompanied by momentary palpitation or slight weakness. The distinction as to ventricular, auricular, or nodal extrasystole can be made instrumentally.

This form of arrhythmia is more frequently due to gastric disturbances or is observed at the onset or crisis of pneumonia. We find it also in shock or fright in nervous people, and it may be caused by tobacco and digitalis. The serious cases are found accompanying cardiac failure.

Treatment.—The treatment depends upon the underlying cause. In transient arrhythmia without circulatory failure no treatment but bromids may be administered. Gastric disturbances may be eliminated by diet and hydrochloric acid. Circulatory failure may necessitate the administration of digitalis, strophanthus, caffein and camphor.

Auricular Fibrillation

Auricular fibrillation is a common and serious heart irregularity. In severe cases no two successive pulse beats are alike. Clinically we observe it in myocarditis and in decompensated mitral stenosis and occasionally in septic pneumonias. The auricular flutter may exist at the rate of 350 per minute.

Treatment.—Potassium iodid treatment and digitalis are the main remedies. Digipuratum, which is obtained in 1½-grain tablets, should be given—one tablet a day for weeks and even months. Under its use the arrhythmia may not disappear, but the patient will feel comfortable. Iodid of potassium (gr. 3 to 5) twice a day may be taken for weeks.

Quinidin sulphate is at present receiving considerable interest as a remedy in this condition. The Massachusetts General Hospital has recently commenced to employ it and is reporting very favorable results. A test dose of gr. 3 is given at 2 and 4 P.M. on the first day, and if the patient shows no toxic symptoms from it, the dose is increased to gr. 6 to be taken five times daily until normal heart rhythm is restored or toxic symptoms appear.

Dr. L. F. Bishop, of New York, recommends highly the use of powdered digitalis, gr. ½ and ipecac, gr. ⅛ every 4 to 6 hours.

If syphilis, alcoholism or nephritis are the underlying causes they must receive due consideration in the management of the case.

Tachycardia—Paroxysmal Rapid Heart

In paroxysmal rapid heart, or tachycardia, the attacks come suddenly in hearts apparently sound as well as in damaged hearts. Alcoholics are subject to tachycardia, also the offspring of alcoholic parents. Mental and sexual unrest are causative factors.

In typical cases the heart's action is so rapid that the pulse cannot be counted. The temperature in the attack is usually normal, and the patient is pale and of an anxious expression and willing to lie down on account of dyspnea; some are able to be up and about.

Treatment.—Apply cold to the region of the heart and give bromid of sodium (℥ i) internally or morphin (gr. ¼ to 1/6) subcutaneously, or ethereal tincture of valerian, in twenty drop doses, and subsequently pay attention to any discernible underlying cause.

Bradycardia

Bradycardia, slow heart, may be pathological or normal. Some individuals have a very slow heart's action. It is seen in the puerperal state, in convalescence from infectious disease, probably from exhaustion, in cachexia, jaundice, cholemia, fainting spells, in anemia, diabetes, seasickness, poisoning from opium, fibroids of the uterus, disease of the central nervous system, sunstroke and heat stroke, exhaustion, and hunger. Straining at stool gives rise to a slow pulse, as does cervical injury and occasionally an epileptic seizure. In true bradycardia both auricles and ventricles beat slowly (40 to 50). The differential points between bradycardia and heart block are given under Heart Block.

Symptoms.—The symptoms vary with the underlying cause.

Treatment.—Treatment is directed to the underlying cause and is stimulating. If it is from exhaustion or nerve poisoning, following infectious disease, absolute rest, mild general massage, strychnin, camphor, ether, and artificial warmth are indicated.

General Plan of Treatment of Arrhythmias

Digitalis is not indicated in simple arrhythmia without dropsy. We treat or remove the underlying cause if it can be found. In arrhythmia and slow heart following infectious disease, camphor, ether, strychnin, and other stimulants are to be administered.

In the arrhythmia of old age the heart will want stimulants, such as alcohol, strychnin, and opium. The patient should rest after eating, and should eat a little at a time and frequently. Moderate exercise, country life, avoidance of worry, occupation of the mind, reading, and playing cards and other games are to be recommended. In painful arrhythmia, strophanthus is suitable.

In serious forms of arrhythmia depending upon organic heart disease or valvular or muscular insufficiency or upon some unknown permanent disturbance of heart innervation, the treatment will be stimulating, sedative, or specific, as the case may be. The bowels must be kept free, the skin active, and the tongue clean. If syphilis cannot be excluded, potassium iodid per rectum is indicated. Warburg's tincture or arsenic is called for in suitable cases. Atropia should be tried.

Angina pectoris

This form of circulatory disturbance is supposed to be due to imperfect cardiac nutrition and changes in the coronary arteries, and gives a grave *prognosis*. The pain of true angina is agonizing and extends into the neck and arms, with great fear of death. It occurs mostly in adults in connection with other clinical evidence of disease in the heart or vessels. The face is ashy, the patient has a cold sweat, the pulse may be regular or irregular, and the pain may last up to a minute or two. The patient is exhausted for some time after the attack. Attacks may recur at long or short intervals and may end in death.

A *mild true angina* is noticed in valvular disease. There is a sensation of deadness and stiffness—cold and pain in the back and neck. As a rule there is no pain in heart disease; angina makes the exception. The patient is afraid to move or breathe. At the end of the paroxysm there is flatulence, with eructations and a desire to urinate. True angina appears to have no connection with defects of the mitral valve and is more symptomatic of fatty muscular degeneration, heart syphilis, and arteriosclerosis.

The state of the heart during a paroxysm is not known. The pain comes on during exertion.

Diagnosis.—We must distinguish angina pectoris from the pain of aortic aneurism, pericarditis, and pleurisy, and from pain over the heart in a hyperesthetic area and pain in the intercostal muscles.

Treatment.—A person subject to attacks of angina pectoris must lead a quiet life, avoiding excitement and overexertion, and should always sleep in a cool room. A dose of laxative medicine should be taken once a week at least, and five drops of hydrochloric acid may be taken after eating.

In the way of diet the patient should avoid beans, pork, rich dressings, dense cheese, pastry, and fried sea food.

In the attack the patient may have internally from 10 to 20 drops of Hoffmann's anodyne or compound tincture of valerian or 5 to 10 drops of chloroform on cracked ice. A hypodermic injection of morphin (1/4 of a grain), with atropin (1/100 of a grain), may be indicated. Inhalations of amyl nitrate (gtt. ii to v), or sulphid of ethyl (gtt. 20 to 30), often give relief.

If the heart is weak after an attack, the patient must rest in bed and also rest after eating.

Should syphilis, malaria, anemia, gout, etc., be suspected as the underlying cause, the proper management must be inaugurated. General massage is helpful in all circulatory disturbances, and bromural subdues nervous irritability in 10 to 20 grain doses.

Spurious angina pectoris

Hysterical angina is a common ailment in neurotic girls and women. They complain of a sensation of deadness and stiffness and have pains in the back and neck.

Treatment.—The attack is best cut short by loosening constricting clothes and administering ammonia by the nose and the ethereal tincture of valerian (gtt. xx) internally in water. Judicious management of an underlying neurasthenic condition will improve and cure the patient.

Heart Block and Stokes-Adams Syndrome

The clinical diagnosis is based upon the recognition of a slow regular ventricular action (35) and a more frequent jugular pulsation. In the Stokes-Adams syndrome the patient has syncopal attacks with occasionally convulsions with pulse intermissions but with persisting auricular contractions. Sometimes Cheyne-Stokes breathing is present. Blocking of the auriculoventricular conduction system by tumors, atheroma, syphilitic infiltrations and diffuse myocarditis are factors in heart block. A purely functional heart block is problematic.

Treatment.—Treatment of heart block depends on the underlying cause. In cases with a positive Wassermann reaction mercury, the iodids and salvarsan in weak doses of 0,2 (gr. iii), until 0,6 (gr. x) have been administered, are indicated. Digitalis in combination with atropia should be tried and venesection may prove to be helpful.

Cases of transient heart block due to intestinal toxemia and responding to treatment of the underlying cause have been reported.

Valvular Heart Disease

The heart is liable to functional and structural derangements, many of which can be recognized clinically, and among the latter the valvular defects play an important rôle.

A *valvular defect* is of accommodative importance. As a sequel and correction of valvular insufficiency or obstruction *Nature furnishes us with compensatory hypertrophy of the heart muscle,* but muscular degeneration and *dilatation* manifest themselves earlier in the damaged heart than in the strong heart, and shorten the tenure of life. The action of the heart is increased and depressed by *nervous influence;* worry and anxiety act unfavorably upon the heart and particularly upon a damaged heart; therefore, *don't worry the patient by keeping him continually under strict supervision and treatment.*

The various valvular defects do not influence or disturb the circulation in a like manner, but clinically this is more of prognostic than therapeutic import. We have no separate treatment for the individual sets of valves, and an exact valve diagnosis cannot always be made, nor is it absolutely necessary as regards treatment. Treatment really begins when the hypertrophic heart muscle becomes insufficient and the heart is unable to empty itself. Sclerosis and fatty degeneration of the heart muscle influence its function and compensation becomes disturbed. Valvular defect of the right heart and weakness of the right heart muscle produce venous stasis.

A derangement in the mechanism of the cardiac valves places an obstacle in the way of the onward flow of the blood. To maintain the circulation under these conditions, the heart necessarily enlarges by hypertrophy of the myocardium.

The estimation of valvular insufficiency or obstruction as a problem of hydrostatics is easier than the estimation of the loss of elasticity of muscle or the reserve power of the heart. The prognosis as to tenure of life in cardiac disease is therefore somewhat uncertain.

Signs and Symptoms of Valvular Lesions

1. Aortic Stenosis.—*Systolic murmur* in the aortic area at the right edge of the sternum, in the second or third space, is transmitted upward to the right sternoclavicular articulation or may be heard along the right

edge of the sternum lower down; occasionally it is accompanied by a *thrill,* particularly if it follows rheumatic fever. *Functional systolic murmurs* in this region are also heard in anemia, in *anemic individuals convalescent from acute illness;* in *impaired flexibility of a valve without stenosis in middle age,* and in *dilatation of the aorta just above the valves.*

Diagnosis.—The diagnosis will depend upon the history, the aspect, the age, and the absence or presence of concomitant symptoms. A loud murmur indicates strong ventricular action. In actual obstruction we observe cardiac hypertrophy and deranged circulation, and a low and forcible apex beat, the pulse wave being long and slow and the pulse small. In actual obstruction of the aortic valve the mitral valve may suffer severe strain and become incompetent, which is a downward step in the evolution of the disease.

Prognosis.—The prognosis is not so serious as in aortic incompetence, but more serious than in mitral incompetence. Sudden death from it is improbable.

2. Aortic Incompetence.—A *diastolic murmur* in the aortic area is sometimes heard in the third left space and may be *conducted downward to the apex.* There is *violent arterial pulsation,* particularly in the carotid and brachial arteries. *Pulsatile reddening* of the skin is noticed when a red patch on the skin is brought out by friction. *Capillary pulsation* is also noticed from various causes, producing a low tension pulse. The pulse is a *collapsing water hammer pulse* (Corrigan), and has a peculiar double beat (biferens). In advanced cases the pulse is irregular and the aortic second sound, if looked for over the carotid in the neck, is absent. Concomitant stenosis modifies the pulse signs. There will be in addition to hypertrophy, dilatation of the left ventricle, with a marked apex beat displaced downward and to the left and lifting of the chest wall. Other symptoms are breathlessness, syncopal attacks, anginal attacks, and precordial pain. Sudden death is apt to occur. Mitral regurgitation may coexist.

Prognosis.—When the lesion is not due to degenerative changes in the heart, and the signs and symptoms already enumerated are mild, the patient may enjoy life for many years, and much will depend upon age, habits, occupation, and the time of life when the lesion was acquired.

Aortic insufficiency may be due to endocarditis, of syphilitic, rheumatic, or malarial origin, and possibly to prolonged strain (athlete's heart). A relative insufficiency due to dilatation of the aortic ring is rare.

3. Mitral Regurgitation.—There is a *systolic murmur* at the *apex* or beyond the apex, toward the axilla, often heard at the back of the chest, between the scapula and the spine, a portion of the ventricle resting upon the spinal column. Occasionally the murmur is heard in the third or fourth space in the vertical nipple line.

Differential Diagnosis.—A systolic aortic murmur is conducted

toward the apex. A systolic tricuspid murmur, regurgitation, is lost to the left of the apex and heard between the apex and the lower end of the sternum. *Spurious pulmonic* murmurs due to compression of the edges of the lung by ventricular systole are not audible during expiration.

The pulse in mitral regurgitation is usually irregular in rhythm and force, probably owing to varying pressure during inspiration and expiration. When a murmur is present and the first sound persists, the leakage at the valve may be slight. A loud murmur means a strong ventricle. A musical murmur is sometimes heard. The pulmonic second sound is accentuated, and hypertrophic dilatation of the right ventricle follows. The apex beat is displaced outward to the left with extension of the area of deep dullness. In slight regurgitation maximum symptoms are missing. In severe, advanced cases dyspepsia, dyspnea, dropsy, and liver enlargement are present.

Functional mitral incompetence without valvular disease may result from anemia or acute febrile disease. Mitral murmurs are heard in debility and old age.

Hemocardiac murmurs are usually soft and blowing and do not replace the first sound. They are not conducted to the axilla or back, and there is no displacement of the apex beat. There are exceptions, however. The history of the case is important. Murmurs with coexisting anemia and rheumatic fever are difficult to explain. Temporary regurgitation in acute rheumatic fever is possible and does not invariably indicate valvular lesion. A mitral murmur associated with chorea and with antecedent rheumatism may be functional and temporary or organic, and a lengthy observation is often necessary to come to a definite conclusion. Mitral regurgitation—incompetence—may be established imperceptibly in middle and old age, with and without organic valvular alteration. The regurgitation may be the same as in anemia and flabby heart (relative insufficiency) or may be due to an enlargement of the auriculoventricular opening from dilatation of the ventricle from some form of undue arterial tension.

Prognosis.—This is the least serious and most amenable to treatment of all valvular lesions. Slight regurgitation permits of old age, and women may marry. Dropsy, pulmonary and hepatic congestion, and edema come and go.

4. Mitral Stenosis.—This is a serious form of valvular disease, relatively frequent in women. The murmur is diastolic, the pulse is usually of high tension and regular until heart failure sets in, the heart is enlarged, and the apex beat is displaced to the left and downward in pronounced cases with powerful shock and thrill. The pulmonic second sound is accentuated from back pressure.

Three stages may be observed in the evolution of mitral stenosis. In the first stage a diastolic murmur and diastolic sound are heard at the apex; in this stage no serious symptoms are observed. In the second stage the diastolic sound has disappeared and is replaced by a diastolic murmur.

This is best distinguished from the systolic murmur of incompetence by feeling for the heart shock at the time of auscultation. A murmur synchronous with the heart impulse is systolic. If we listen at the heart during an attack of palpitation or tachycardia, all murmurs are indistinct, but reappear after the heart is quieted. In the third stage the diastolic murmur frequently disappears, and an exact diagnosis may be difficult.

Other symptoms are breathlessness on exertion, dyspeptic symptoms and nausea with a tendency to congestion of the lungs, hemoptysis and arterial embolism, and enlargement and pulsation of the liver. When decompensation sets in, in combined stenosis and regurgitation, the signs above mentioned fluctuate and the heart's action becomes irregular.

Prognosis.—When mitral stenosis is established in childhood, the prognosis is more serious than when it is established at a later stage. When attacks of delirium cordis, or tachycardia, supervene in mitral stenosis, the patient's life is in great danger from acute pulmonary edema.

Tricuspid Incompetence and Stenosis, when pronounced, are usually congenital.

Tricuspid Regurgitation, with or without a murmur, is usually due to back pressure in the lungs in valvular disease of the left ventricle. The murmur, if present, is *systolic* and heard to the *left* of the *sternum* in the vertical nipple line. It is often mistaken for a mitral regurgitant murmur. The veins of the neck are distended and pulsate, and the damming back of the blood in the vena cava inferior enlarges the liver to a point of pulsation.

Tricuspid Stenosis is usually associated with mitral stenosis. The rational physical sign is a *diastolic murmur* in the *tricuspid area,* with distention of the jugular veins and no pulsation. Dropsy occurs at an early period. This condition may be mistaken for mitral stenosis.

Pulmonic Stenosis is congenital and often associated with a patent foramen ovale and perforated interventricular septum. The *murmur* is in the *pulmonic area* and *systolic,* but such systolic pulmonary murmurs are also heard without change in the orifice and valves, viz.: in anemia. A systolic murmur in the pulmonary area is occasionally heard in young adults with no other evidence of heart trouble. It is supposed to be due to incomplete covering of the conus arteriosus by the overlapping lung, so that during systole the conus is flattened out against the chest wall, forming an eddy in the blood current and thus giving rise to a murmur.

Other congenital malformations are *incomplete interventricular septa, patent foramen ovale, persistence of patent ductus arteriosus, transposition of the pulmonary artery* and *aorta,* and *malformation of the valves.* Children and infants suffering from such malformations are fretful, may have convulsions, do not sleep, have clubbed fingers and toes, are anemic or cyanotic, remain backward in growth and intelligence, and may or may not have murmurs.

Prognosis.—With a *diagnosis* of *congenital heart disease* the prognosis is that many die at an early age or of intercurrent disease.

Valvular lesions in children present no special difficulty in diagnosis. Dyspnea on exertion, anemia, a bluish tinge of the skin and mucosa, clubbed fingers in advanced cases, all forms of dropsy, and congestive symptoms are found—headache, loss of appetite, liability to bronchitis, and bulging precordia.

Summary of Diagnosis and Prognosis

The statement will bear reiteration that a cardiac murmur does not constitute a heart lesion. There are accidental and functional murmurs persisting through long life and accidental murmurs which appear during a period of relative incompetency in flabby, anemic, neurotic, and fatty subjects or overworked hearts and disappear when the heart has regained sufficient tone. A functional intraventricular murmur is systolic in time, half way between the apex and the base. It is not anemic and not heard in the neck, and it is due to cardiac debility, that is, the papillary muscles fail to contract in unison with the walls of the ventricles. It presents no post mortem lesion and frequently disappears.

When a valvular lesion is strongly suspected and its exact location is doubtful, no anxiety need be felt by the medical man as regards its precise rational treatment, for it is practically the same in all valvular lesions. With an apex beat in normal position and of normal rhythm, no anxiety need be felt regarding a murmur. The cure of a heart lesion should not be set down as hopeless until iodid of potassium has been tried.

Regarding prognosis, each case must be judged on its own merits. Small people bear a valvular lesion better than tall and bulky persons, and women better than men. Worry aggravates all heart cases, also damp living apartments and poverty. Marriage should not be interdicted except in severe forms of heart disease. During parturition women often present various congestive symptoms which pass off after the termination of pregnancy, and twenty years of happy married life are better than thirty years of celibacy. It is well, however, to warn such patients of the danger of repeated pregnancies.

Prophylaxis Against Valvular Heart Disease

Hygienic living, the avoidance of overstrain, oral and nasopharyngeal hygiene and prophylactic measures against acute and chronic infections and early rational and specific treatment of infectious diseases are the prophylactic efforts which suggest themselves for warding off heart damage.

It is to be hoped that the near future will find us in possession of a polyvalent serum with immunizing and curative properties against the more common types of infection.

Principles of Treatment

As soon as the diagnosis of valvular heart disease is established, the following considerations come up: no dancing for children, except square dancing; rest in bed for choreatic children with murmurs; sunshine and good air for rheumatics; no damp living rooms; removal from malarious regions.

The clinical course of valvular heart disease admits of a division into three stages: the attainment of compensation, full compensation, and loss of compensation. The treatment of such symptoms as arise during the three stages is practically the same for *all varieties of valvular defects.*

Until compensation is attained the patient will complain of palpitation, occasional nausea, short breath, and nervousness. *Heart drugs are not indicated at this stage.* The patient must lead a quiet and orderly life and avoid worry and overstrain. Young men should be advised to enter some field of usefulness in harmony with their "weak heart." Severe exercise, such as swimming and violent dancing, should be interdicted. The school work should be less exacting than for the healthy; girls should rest one or two days during menstruation; cool and cold sponge baths are advisable. In the way of exercise walking is advisable; moderate bicycle exercise on *level* ground is permissible. Alcohol, coffee, tea, and articles of food apt to produce flatulence, such as beans, peas, lentils, doughnuts, rich pastry, and Swiss cheese, should be avoided. A narrow diet is not called for. All meats may be eaten except pork, all salads except mayonnaise salads, all cereals, eggs, ham, fruit, stale bread, water, mineral water, and ginger ale are to be allowed. The stomach should not be *filled* with food or liquids. The bowels should move once a day, or an enema of soap water should be given before the patient goes to bed, occasionally a laxative or brisk purge (maltine with cascara) for children is indicated. Instead of a laxative drug, intestinal massage can be employed. Ten grains of blue mass followed by a Seidlitz powder for adults, once a week, may be taken. The underclothing should be of thin wool or linen mesh. Protection from cold is best secured by thick outer coats and wraps.

To aid digestion, five drops of hydrochloric acid in sugar water may be taken after each meal, or Horsford's acid phosphate in water. Patients should be warned against great altitudes and Turkish or Russian baths. Long sea voyages are not well borne by damaged hearts. The utmost care should be exercised not to contract typhoid fever from contaminated water and other sources. Typhoid fever and pneumonia give an *unfavorable prognosis* in patients with weak hearts. Anesthesia in cases of weak heart should be carefully considered. The danger of obesity from indolence and overeating should be discussed with the patient. Tobacco in moderation is not always harmful, and the author knows of a number of patients, including physicians, whose rapid heart quieted down after a mild smoke

and who attained an age of fifty to sixty with mitral insufficiency persisting for from twenty to twenty-five years.

When compensation is broken, as shown by marked dyspnea, dilated heart, irregularity of action, and edema, the treatment may require *cold baths,* carbonic acid baths, rest in bed with massage and passive motion, depletion by the bowels, or *venesection* when respiration is markedly embarrassed and compression of the upper arm shows the veins standing *out like whip cords* (*see* Bedside and Office Technic).

The cardiovascular tonic douche is discussed in Section I.

Carbonated baths as they are given at Bad Nauheim appear to exert a beneficial influence on the circulation by slightly stimulating the skin. Such baths can be given in the house by making use of lumps of chemicals

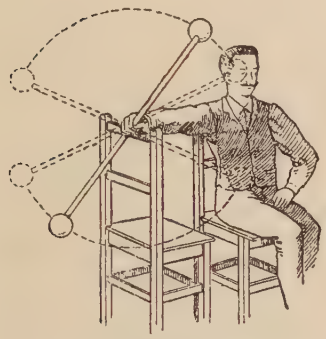


Fig. 125.—Passive and Active Movements.

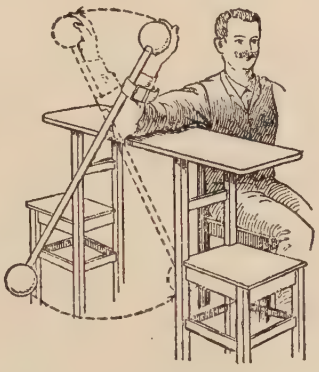


Fig. 126.—Flexion and Extension at the Elbow Joint.

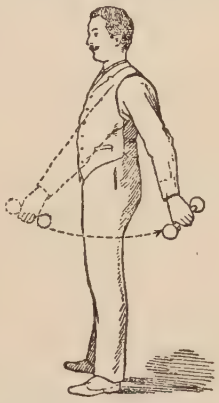


Fig. 127.—Swinging of the Arms.

Figs. 125, 126, 127.—Rotation of the Hand and Arm. (After Billings-Forchheimer, "Therapeusis of Internal Diseases.")

that generate carbon dioxid, or better still, by aërating the bath water with carbon dioxid by means of liquid carbon dioxid from a cylinder, now obtainable in all large cities and many country districts, as it is largely used in drawing beer from the cask. Mild, general massage, practiced several times a week, together with passive motion, is a better aid to the embarrassed circulation than any form of bath; of course massage can be employed in connection with hydrotherapeutics.

This bath treatment is carried on for from five to six weeks with an intermission once or twice a week. The temperature of the bath is to be about 95° F. in the first week, and may be as low as 80° F. in the sixth week. The baths are brine baths, 2 pounds of sea salt to 50 gallons of water, gradually increasing in strength to 10 pounds of sea salt to 50 gallons of water. The gas generating chemicals are placed in the bottom of the tub of warm brine.

Resisted movements and carbonated baths are combined in the treatment of heart insufficiency as follows:

The patient makes regular voluntary movements, which are resisted by the physician or operator. These movements are quite gentle, and if there should be any weariness on the part of the patient, or his breathing gets to be rapid, an intermission is given until the equilibrium of respiration or pulse is restored.

The movements are simply flexion, extension, adduction, abduction, and rotation of the limbs, neck, and trunk. As a rule these exercises improve both the heart and the circulation.

Another form of bath for improving the circulation is as follows: The patient remains for ten minutes in a tub half filled with lukewarm to cool water in which he moves about gently. This is followed by douching with a pailful of cold water, after which the patient is quickly dried and rests on a couch for half an hour and then takes a light breakfast and a leisurely walk. The careful climbing of *moderate elevations* is beneficial in the early stage of valvular lesions, but mountain climbing is decidedly injurious.

Where moderate exercise, baths, proper diet, and massage, with the occasional administration of ten grains each of calomel and jalap or other laxatives, fail to quiet the heart or to aid it in accomplishing its work, we are compelled to make use of drugs and to keep the patient in bed for a week or two.

The symptomatic management of heart cases after all physical and simple methods have been tried is as follows:

For *palpitation* in the first and second stage of valvular disease with strong muscle apply an ice bag to the heart, and give sodium bromid (gr. x to xxx) once or twice a day. Prescribe moderate exercise, a cold sponge bath, and tincture of aconite in two drop doses several times a day.

Palpitation in the third stage, with heart dilatation and dropsy, requires venesection and stimulating treatment with digitalis, strychnin, or opium (*see* chapter on Dropsy).

Nausea is a distressing symptom in circulatory failure for which we may administer dilute hydrochloric acid in 5 drop doses after eating or Horsford's acid phosphate, 30 drops in water, after eating. In some cases a tablespoonful of coca wine after a meal does well.

Anemia is a prominent feature in many cases of cardiac disease. The patient should live out of doors as much as possible and iron tropon in half teaspoonful doses twice a day, or the following prescription, may be taken:

℞ Acid arsenicos..... gr. ii 0,12
Ext. digitalis..... āā 5i 4,0
Ext. nux vomica.....
M. Ft. pil. 60
S.—One pill three times a day.

For *hepatic congestion* order rest in bed and give:

℞ Podophyllin..... gr. ½ 0,03
Calomel ..... gr. x 0,6
Pulv. aromat..... gr. iii 0,2

In one dose for an adult, followed by venesection and digitalis if necessary.

For *pulmonary congestion:*

℞ Pulv. digitalis..... gr. i to ii 0,06-0,12
Camphorae ..... gr. i to ii 0,06-0,12
Acid benzoic..... gr. ii to v, in wafer 0,12-0,3
Give one three times a day (for adults).

Or

Infusion of digitalis in tablespoonful doses four times a day.

Or

digipuratum tablets—one tablet three times a day.

Or

potassium iodid (gr. x to xx) twice a day in water per rectum.

Or

strychnin nitrate (gr. 1/50, 0,001) three times a day.

Or

nitroglycerin (gr. 1/100, 0,0006) three times a day.

In *cardiac dyspnea* we may administer:

℞ Morphii sulfur..... gr. ⅛ 0,007
Tinct. strophant..... gtt. vi 0,5
Spir. frumenti..... ℥i 4,0
Sig.—Give in one dose.

Or

℞ Ext. digitalis fluid..... } āā, ℥ii 8,0
Tinct. opii..... }
Sig.—Two to four drops every three hours.

Iodid of ethyl may be given by inhalation; dose, 30 drops (2,0).

Atropin sulphate (gr. 1/200, 0,003) may be given subcutaneously.

Or

℞ Spartein sulphate..... gr. 1½ 0,09
Ext. digitalis fluid..... gr. xv 1,0
Aquae .....ad ℥ii 60,0
Sig.—A teaspoonful every two hours.

In *insomnia* we give:

℞ Hydrate chloral.... .....
Sodium bromid..... } āā, gr. x to xx (0,6-1,3) at bedtime

Or

Codein	gr. i	0,06
Urethane	3ss	2,0

One dose at bedtime.

Or

Hyoscin	gr. 1/100	0,0006

Or

Sulphate of morphin hypodermically, gr. ⅛ to ½, 0,007-0,03.

In *acute pulmonary edema and collapse:*

Camphor oil subcutaneously, 15 grains to 3iv of oil; dose 15 drops every three to four hours.

Digitalis in whisky subcutaneously.

℞ Ext. digit. fluid.....	3i	4,0
Spir. frumenti.....ad	3iv	16,0

Fifteen drops every four hours.

Benzoate of sodium and caffein, gr. ii to v subcutaneously (0,12-0,3), every three hours.

Venesection (*see* Bedside and Office Technic).

Continuous Digitalis Treatment.—When that period arrives in which we are no longer able to produce a lasting compensation by rest, dieting, baths, massage, and short courses of medicine, we may make life more comfortable by administering digitalis (four to eight grains of the powdered leaf) on one day once a week, with strychnin and opium between or in combination, or one tablet (gr. 1½) of digipuratum daily for weeks and months.

The management of heart disease in children is practically the same as in adults. The dose of drugs must be reduced one-quarter or one-third.

Resumé.—We find practically three groups in cardiac therapeutics: Cases in which no special treatment is required, cases in which excessive growth and strong action call for aconite or veratrum viride, the bromids, etc., and other sedatives, and cases in which the heart falters and needs support, and for which digitalis, used differently according to varying indications, is the principal remedy.

This line of *treatment is held to independently of the exact valve* which may be affected.

In *functional valvular disorders* the treatment is by rest, graduated exercise, rational diet, and hydrotherapy.

In *heart neurasthenia* we advise active exercise, rational diet, and fortifying baths. Where heart disease has been known to exist for several generations in a family, it is important that the children should be protected, as far as possible, from even the minor infectious diseases. So mild an infection as mumps has been known to cause a serious heart lesion in such susceptible individuals.

Work Cure for Cardiac Convalescents

A trade school for cardiac convalescents was opened in Sharon, Connecticut, in 1913, with the following announcement:

It is intended exclusively for patients suffering from heart disease and convalescent after an acute attack. Here, in addition to receiving convalescent care and treatment for several months, they are taught a trade by which they may continue to be wage-earners without the danger of further damage to their already crippled hearts.

The patients are chiefly selected from the wards and dispensaries of New York hospitals, and they are men who have been engaged in laborious occupations—work which they cannot resume with safety because of the nature of their illness.

Heretofore there has been no provision for the convalescent care of such patients. All other convalescent homes discriminate against these "cardiac cases" because of the danger of serious illness or of fatalities among them. To provide for such emergencies means the added expense of more resident nurses and of stricter medical supervision. The Sharon home has assumed this risk and additional expense in order that these heart cases may have not only the convalescent care they need upon leaving the hospital, but also the opportunity to learn a trade suitable to their physical condition.

Much has been done for the physically handicapped of almost every other class—the blind, the crippled, the tuberculous—but this is the first effort to give systematic help to cardiac cases. It seems to those who are interested in this effort that it is worth while, at whatever cost, to give these men a chance to earn their livelihood without endangering their lives; for it is, in the end, a better economy to keep them well and at work than to sustain the expense of their care in our hospitals and that of their families during the illness of the wage earner.

This experiment in practical philanthropy has three aspects: first, to provide convalescent care for these heart cases; second, to select a trade or industry suitable for them; and third, to give them employment at this trade upon their return to their homes.

In the author's opinion efforts in this direction are of far reaching benefit and deserve to be liberally supported everywhere. A special dispensary could be arranged to act as a clearing house for cardiac convalescents of all ages.

The Management of Edema and Effusion in Cardiac Insufficiency

Anasarca—General Edema

In most diseases, organic or otherwise, which end in cardiac insufficiency or cachexia and hydremia, a dropsical condition of the body or its dependent parts will ultimately develop. This dropsical condition of the tissues will be more or less symmetrical, that is, affect both sides of the body, in contradistinction to *localized edemas due to local disturbances.* Although cardiac dropsy usually first shows itself at the ankles, and renal dropsy at the upper part of the body (puffy eyelids, etc.), such phenomena should not be relied upon for a snap diagnosis. On the contrary, a careful clinical inquiry or examination must at once be made and the primary cause of the dropsy elicited.

General Management

The general management of dropsy as a symptom includes tonic treatment, hydragogue cathartics, diuretics, heart tonics, "dry living," sweating, and venesection.

Diuretics and heart tonics are often of great service and may be used as follows:

Infusion digitalis, gr. xxx to ℥iv, a tablespoonful every two, three, or four hours. To each bottle of infusion half an ounce of acetate of potassium and some syrup may be added. Or the following may be given:

℞	Digipuratum	gr. iss	0,09
	Camphorae	gr. ii	0,12
	Flor. benzoes.....	gr. v	0,3

M. S.—Three to four powders each day.

Camphor is a valuable heart tonic and diuretic. Ten to fifteen drops of camphor in oil (15 per cent) may be given subcutaneously. *Potassium iodid* acts as a diuretic. In some cases twenty grains in two ounces of warm water may be administered per rectum two or three times a day. To prevent iodism, ten grains of *chlorate of potassium* may be added to each dose of the iodid. *Diuretin,* in half dram doses, may be given four times a day, or five grains of *benzoate of sodium* and *caffein* three times a day.

The following is also effective:

℞	Tinct. digitalis.....	℥ii	8,0
	Sol. nitroglycerini (1 per cent).....	℥i	4,0
	Tinct. strophanthi.....	℥i	4,0

M. S.—Fifteen drops four times a day.

In children the doses are proportionately smaller.

Sweating in Anasarca.—Sweat boxes of all sizes and shapes are obtainable. In the absence of a hot air apparatus, the patient is placed nude on a chair and covered with a large blanket. Underneath the chair a lighted alcohol lamp is placed. Hot air may also be conducted under the blankets while the patient is in bed, by means of a sheet iron oven with a spout and an alcohol lamp; or the patient may be placed in a bathtub closed by means of a heavy blanket, so arranged that the head is free. "Waterlogged" patients should live on a *dry diet,* and take just enough liquids to quench thirst.

Water may be removed from the body by means of hydragogue cathartics, such as *calomel (gr. 10), and podophyllin (gr. ⅓ to ½),* or blue mass (gr. 10) and podophyllin (gr. ¼ to ½), with the addition of aromatic powder to prevent griping; such a dose to be taken once a week.

Another plan is to give sulphate of magnesium in teaspoonful doses, as follows: *First day*—One teaspoonful every hour until about fourteen stools are secured. *Second day*—Rest. *Third day*—Sulphate of magnesium. *Fourth day*—Rest, and so on until the dropsy is gone. In some cases this treatment exhausts the patient and must be discontinued. Elaterin, in 1/15 grain doses, may be given every 3 to 6 hours for several days and the treatment continued with heart tonics, such as digitalis, strychnin, opium, etc.

Venesection in Dropsy.—Whipping up the heart by stimulants, aided by cathartics and sweating, is effective so far as it goes. In cases in which the desired effect is not obtained after a reasonable time, it is useless to continue without at the same time relieving the heart by venesection.

The benefits of bleeding are twofold: 1. The relief of vascular engorgement. 2. The removal of some of the toxic products which have accumulated in the blood as a result of insufficient elimination from failure of the emunctories.

The technic of venesection is described in the section on Bedside and Office Technic.

Edema of the Lower Extremities

The presence of edema in the lower extremities is not an urgent symptom, since it does not tend, like hydrothorax, to aggravate the failure of the circulation, the two conditions acting and reacting on one another. There is less necessity for tapping in edema of the lower limbs, but there are cases where it may prove of service by relieving pain and excessive tension. Before we scarify or drain a limb it may be wise to attempt to influence the edema of the extremities by elevation, mild massage, or an elastic bandage *in connection with the constitutional treatment outlined above.*

Elevation of a limb is readily secured when the patient by choice or

necessity is confined to his room or is limited in his excursions to the veranda or garden. For patients who are up and about, *pressure* can be utilized to overcome edema of the feet. The writer prefers an elastic bandage to the rubber stocking. The rubber roller bandage should be three inches wide and from four to five yards long. A thin cotton stocking, with the toe end cut off, is first put on and the bandage is evenly applied, without much stretching, from the toes to the bend of the knee. The bandage is applied on rising in the morning and taken off on going to bed. This is also good treatment for varicose veins.

Massage is a valuable aid in the management of edema, particularly in connection with the hot air treatment.

Scarification and linear incision are useful methods. After thoroughly cleansing the skin with green soap and carbolized water, a puncture or linear scarification is done with an aspirating needle or scalpel, and the watery exudate is absorbed by a sterile cheesecloth dressing. There is always some risk from secondary wound infection by this method, but with great care this can be avoided. Fluids may be removed from punctured or scarified edematous tissue by means of cupping glasses or the vacuum aspirator.

Ascites

(*See also* Section I)

Ascites is an accumulation of fluid in the peritoneal cavity. It may be free or sacculated. If it is free and the patient is on his back, the fluid will give dullness on percussion, and the line of dullness will change with a change of the patient's position. If the abdomen is not well filled, its center is resonant on percussion on account of air-containing intestines floating on top. A small amount of fluid may be made out by placing the patient in the knee-elbow position and eliciting dullness on percussion from below about the region of the umbilicus. When considerable fluid is present, a fluctuation or percussion wave may be elicited by bimanual manipulation. The character of the fluid is made out by means of the aspirating needle or syringe.

Diagnosis.—*Pregnancy, ovarian cysts, a distended bladder, omental cysts,* and *hydatid* and *pancreatic cysts give dullness over the center of the abdomen or wherever they are located and tympanitic resonance in the flanks.* A free serous effusion in tuberculous peritonitis gives the same physical signs as ascites from other causes.

Cysts and ascites may coexist. A laboratory examination of an aspirated fluid will often distinguish between ascites and ovarian cysts, but occasionally an exploratory laparotomy must be done to establish an exact diagnosis. Hemorrhage from a ruptured tube or ovary may give rise to physical signs of free fluid in the abdomen.

In simple free ascites the history shows gradual uniform nlargement

of the abdomen with flattened sides. The prominent navel with enlarged superficial veins, the fluctuation wave, the dull percussion sound as compared with the tympanitic intestinal sound, the movable dullness on change of the patient's position whenever sufficient free fluid is present, and the character of the fluid obtained by puncture, clear amber, greenish, chylous, or bloody, will aid in establishing the diagnosis.

Ascites without general edema is most commonly due to cirrhosis of the liver or other portal obstruction (tumors). *Ascites plus edema is generally due to renal or cardiac disease.*

Management of Ascites.—If the ascites can be influenced by drugs (digitalis in heart failure, iodid of potassium and mercury in syphilis, or quinin in malarial spleen), such treatment should be adopted and reenforced by cathartics, sweating, massage, and general tonic management. If not, the fluid must be removed by tapping and repeated tapping.

Tapping is done in the median line or the lateral aspect of the abdomen. The patient is placed in a comfortable armchair with a bucket between his feet and a rubber apron over his legs. The parts are cleansed and local anesthesia is secured by means of chlorid of ethyl spray or cocain, a few drops of a 4 per cent solution injected under the skin. A *small incision through the skin facilitates the introduction of the trocar.* To prevent blocking of the cannula by loops of intestine (after some of the fluid has come away), the author has devised and uses a trocar with a sieve-like end.

To prevent syncope, the fluid should be allowed to run out slowly, and the patient may take coffee and whisky. When all or nearly all the fluid has flowed out, the wound is secured by a pad of bichlorid gauze and a strong binder, and the patient put to bed.

Should the trocar strike a large vessel (which is a rare occurrence), and a free and profuse hemorrhage ensue, the abdomen must be opened and the bleeding vessel secured. If the patient is comfortable after tapping, the abdomen may be explored through the lax abdominal walls, and doubtful diagnostic points may be made clear.

Permanent drainage of the abdomen for ascites was first suggested by the writer in 1886. A rubber catheter is introduced into the abdominal cavity through the cannula of a large trocar or through an incision. The protruding part of the rubber tube is secured to the abdomen by means of straps of rubber zinc plaster, and the end of the tube is clamped so as to permit of a periodic flow or removal of fluid, or it may drain into a receptacle if the patient is compelled to remain in bed. Drainage can be kept up for weeks, and in the event of the establishment of a good collateral circulation, improvement of the underlying condition for long periods has been observed and reported.[1] In recurrent ascites from cirrhosis of the

[1] For particulars regarding this method, the reader is referred to the author's original communication in the *New York Med. Jour.*, Feb., 1886, and to subsequent reports by others who have used this method.

liver permanent drainage is of value. The collateral circulation eventually established takes place by reason of the anastomoses of the portal vein with the superior cava and the azygos vein.

Operative Treatment for Ascites.—The artificial establishment of vascular anastomosis has been attempted by attaching a piece of omentum, about two inches square, to the abdominal wall by catgut or kangaroo tendon stitches. Adjacent peritoneal surfaces over the liver have been scarified and made adherent, and the spleen has been fixed to the abdominal wall.

Hydrothorax—Pleuritic Effusion

(*See also* Section I)

Signs.—The rational signs of fluid in the chest are a feeling of resistance on percussion, dullness or flatness on percussion, a tympanitic percussion note above the fluid level, dullness on the right side, continuous with that of liver, the respiratory murmur indistinct or absent (or distant bronchial breathing may be heard), and bulging of the intercostal spaces on deep inspiration. In doubtful cases an exploratory puncture may be necessary to establish the presence and character of fluid. Dyspnea is the principal symptom in pleuritic effusion, and displacement of the heart and crowding up of the lung into the apex space are often observed.

Thoracocentesis.—Fluid in the thorax, whether unilateral or bilateral, can easily be removed, but this should not be done simply because of its presence. Embarrassed respiration and embarrassed heart's action of a severe type are the indications for operative interference.

Thorough cleanliness must be observed in the various manipulations incident to thoracocentesis. The patient is stripped to the waist and made *to straddle a chair with the arms resting on a pillow* over the back of the chair. If necessary, the chest can be tapped with the patient sitting or reclining in bed. After determining that the chest contains fluid, the part selected for puncture is cleansed and the exact spot (seventh or eighth interspace) made anesthetic by the chlorid of ethyl spray or a subcutaneous injection of 4 per cent cocain solution. For aspiration the author prefers the suction apparatus with a bottle. The patient is told not to move and assured that there will be very little pain (children are firmly held). The needle is then introduced. The operator should hold the needle loosely between the thumb and index finger, and the suction pump is to be worked by an assistant. Whenever *the needle is felt to scrape the lung surface,* its point *should be raised or depressed, or slightly withdrawn to make it free.* The patient is enjoined not to talk and to suppress coughing if possible. If a trocar is used instead of a needle, a preliminary small incision through the anesthetized skin is advisable.

When the fluid ceases to flow, or when uncontrollable coughing sets in, toward the end of the operation, the needle or trocar should be withdrawn

and the wound secured with a compress of sublimate gauze and a binder. If, for any reason whatsoever, prolonged aspiration is out of the question in children or adults, enough fluid may be removed to temporarily relieve intrathoracic pressure.

When the pleura is thick and a large trocar is used, it sometimes happens that the thickened membrane is stripped from the chest wall or simply pushed forward, in which event no fluid will flow. The trocar should be withdrawn and a large needle used instead. A *calcified* pleura makes it impossible to introduce a needle. Pneumothorax, subcutaneous emphysema, and pulmonary hemorrhage following puncture of the chest are rarely encountered by careful operators. After the needle is once in position, lateral movements of the same are to be avoided.

In tapping the chest it is well to remember that a line drawn horizontally from the nipple around the chest passes over the sixth intercostal space midway between the sternum and the spine. This rule may prove serviceable in stout people in whom it is difficult to count the ribs.

Non-inflammatory hydrothorax is unilateral or bilateral in cardiac and renal disease or in any form of cachexia or in arteriosclerosis, etc. In some instances a pint or even a quart of fluid in each side of the chest will give but little discomfort, and need not be removed. In other cases, particularly in heart disease, the removal of half a pint or a pint of fluid will give much relief.

The *inflammatory exudates are serous, seropurulent, sanguinolent,* or *purulent.* Their occurrence and management are discussed in the chapters on Pleurisy and Pyothorax.

Seropurulent exudates may be aspirated *once,* and, if they reaccumulate, free incision and drainage are indicated. The *purulent* variety is treated like any other abscess, i. e., by free incision, with or without resection of a portion of a rib, to secure good drainage.

Pericardial Effusion

Pericardial effusion varies in composition and character precisely as does pleuritic effusion. In general dropsy, serum may be found. In inflammatory pericardial effusion the fluid contains more fibrin or corpuscular elements, blood, and pus. As the diagnosis is discussed under Pericarditis, we shall speak only of the indications and method of tapping.

Indications.—Whenever the effusion in the pericardium is so massive as to interfere with the heart's action and thus *threaten life,* it should be removed, be it serum, blood, or pus. Thus, we may be compelled to operate in violent acute cases and in chronic cases with no absorption. The instrument to be used is a medium sized trocar in connection with an aspirator. It is not wise to employ an ordinary sharp pointed aspirating needle, owing to the danger of scratching or puncturing the moving heart.

The parts are disinfected, anesthetized, and incised as in thoracocentesis. The needle is introduced two inches and a quarter to the left of the median line of the sternum, preferably in the fifth interspace, near the junction of the sixth rib with the cartilage, or in the fossa between the ensiform cartilage and the costal cartilages of the left side. The patient should be in bed or sit and lean back. In counting the intercostal spaces, we must remember that the first rib lies under the clavicle. After the fluid has been removed the small wound is closed as in puncture of the chest. A careful manipulator will endeavor to avoid wounding the internal mammary artery or puncturing the auricle. The admission of air should also be prevented. The operation not only is palliative, but may be followed by substantial improvement. If the fluid reaccumulates, the operation may be repeated. If pus is formed in the pericardial sac, incision and drainage are indicated as in pleural empyema.

An *ignition vacuum bottle* for aspirating fluids was suggested by Dr. Carl Connell in the *Medical Record* for July 4, 1903. Three drams of 95 per cent alcohol are poured into the bottle, which is then turned until the entire surface is coated. The excess of alcohol is poured off. The bottle is then placed upright and ignited at the mouth before the film of alcohol has time to dry or settle. A sheet of flame descends into the bottle, varying in time for complete ignition from a fraction of a second to several seconds, depending on the strength of the alcohol and the temperature of the glass. As the flame touches the bottom, the bottle is quickly corked. On attaching the needle the aspirator is complete. It may be employed for the aspiration of cavity fluids and tissue fluids (edema of the scrotum). *See* also Bedside and Office Technic.

Diseases of the Arteries and Veins

General Remarks

Auscultatory phenomena in blood vessels are unsatisfactory. When arterial pressure from any cause whatsoever is permanently increased, there is danger of rupture of capillaries with its direct sequelae, particularly in arteriosclerosis. Arteriosclerosis affecting the coronary artery is a serious damage as regards the nourishment and work of the heart itself. We may have acute arteriospasm, as in strychnin and lead poisoning, and acute dilatation of vessels, as in shock, in which the body bleeds into its own vessels. Vasomotor paralysis from alcohol, chloral, and infusion of digitalis is often confounded with heart collapse.

The venous circulation may be influenced by the force of the heart's action, or by any obstruction to the circulation, disturbance of lung function, pressure of exudates and tumors, pericardial exudates, and pressure on the inferior and superior vena cava, leading eventually to death.

The pulse varies in various individuals and may be normal anywhere from 50 to 100. Children have a rapid pulse on examination and their pulse is frequently irregular even in sleep.

Hypertension

Arterial Hypertension.—*See* also article on Senility.

The precise value of blood pressure determination is not as yet established nor do we know the exact significance of the different abnormal grades of blood pressure. We speak of a moderate degree of hypertension when the mercury tension column ranges from 120 to 150 per cent; when the sphygmomanometer registers from 150 to 175 hypertension is pronounced. This increase in blood pressure we usually attribute to arteriosclerosis, particularly in cases showing a normal heart and normal kidney function. In vascular nephritis secondary to arteriosclerosis our blood pressure reading ranges from 175 to 300. In this class of cases the heart is taxed severely, and it is only a question of time when myocardial degeneration will supervene and furnish the pronounced clinical picture of circulatory failure. A change from hypotension to hypertension is observed in severe infectious diseases—for instance, in scarlatina with kidney involvement. In pneumonia it has been found that when the pulse beats exceed in number the blood pressure in millimeters of the mercury column, stimulants are indicated.

Hypertension is an early symptom of the development of toxemias of pregnancy and may be looked upon as a warning of a defective metabolism, indicating eliminative treatment.

Compensatory Hypertension.—The experienced clinician is well aware that some forms of hypertension may be looked upon as compensatory and salutory—as for instance in tubular nephritis, in which hypertension appears to be a wise provision of nature to maintain renal sufficiency and calls for no interfering.

Treatment.—Foremost in the management of hypertension is diet and elimination. There is no valid objection to a plain mixed diet provided that the quantity of food be limited. By making use of the list of foodstuffs with their caloric values in household measures (*see* Bedside and Office Technic) a diet of 2,000 calories per day can easily be arranged for individuals who are developing hypertension and whose food intake has been between 3,000 and 4,000 calories and over. Warm tub baths taken daily and walking from one to five miles daily are rational methods of elimination.

The value of laxative mineral waters and salts is not to be overlooked and mild general massage will help the circulation. As regards drugs the nitrates and iodids are indicated and may be taken in moderate doses for weeks and months. Aconite as a vasodilator is of considerable value if

given in rather large doses. From five to ten drops of the strong 35 per cent tincture may be given three to four times a day for weeks to be followed by one tablet of iodotropon daily for months. The high frequency current is quite in vogue as a therapeutic measure in hypertension and radium treatment (emanations, baths, waters) is said to give good results if scientifically applied.

Arteriosclerosis

(*Atheroma*)

See also article on Senility.

Definition and Etiology.—This is a chronic inflammatory or degenerative process in the intima, resulting in rigidity of the blood vessels. It naturally accompanies old age, and hence the saying: A man is as old as his arteries; or in other words he may be old at forty. It is often hereditary, and has rheumatism, gout, syphilis, lead poisoning, alcoholism, malaria, chronic intestinal putrefaction, oral sepsis, or high living as an underlying cause, and is frequently associated with heart and kidney disease. It is diffuse or localized in any organ or tissue. It is the underlying cause of organic nutritional changes in organs.

Bright's disease, organic heart disease, hepatic disease, aneurism, hemorrhage, and apoplexy often have their origin in vascular degeneration.

Symptoms of Pronounced Cases.—A hard, high tension pulse, hypertrophy of the heart, dyspnea, capillary hemorrhage in the brain with transient aphasia, hemiplegia, thrombi, gangrene, and insomnia. Arteriosclerosis is not common before the age of forty, and is very rare in children.

An exaggerated tortuosity and increased tension of the walls of the temporal artery does not by any means indicate commencing or existing arteriosclerosis, as is commonly supposed.

Prophylaxis.—There are many things we can do to stave off hardening of the arteries. In view of the multitudinous etiological factors, the detailed enumeration of preventive measures would fill a book. The simple statement that *hygienic plain living* is our main protection against early arteriosclerosis covers the whole subject.

Treatment.—In the early stage the patient must be told his condition with a view of securing his coöperation in changing faulty habits. Medication is not beneficial in the early stages unless syphilis or malaria is present. The skin and bowels must be kept active. As a rule alcohol is prohibited, and a change from city to country life, and vice versa, is beneficial. Mild massage and daily exercise are beneficial. Good water may be taken *ad libitum*.

Diet.—There should be about five hours between meals. The meals should be dry; liquids may be taken between meals.

Specimen Diet.—Cereals, fish, meats sparingly, ham, eggs, tongue,

toast, crackers, salads, onions, milk, coffee, tea, ginger ale, Vichy, hot water, cocoa, and one ounce of whisky a day. Large meat consumers may adopt a vegetarian diet for a time with benefit to themselves.

Medication.—When syphilis or malaria is suspected as an underlying

Fig. 128.—Calcified Blood Vessels (Sudden Death of Patient).

condition, potassium iodid or Warburg's tincture may be given for a time, or calomel (gr. i) three times a day for three days, and occasionally repeated.

In the ordinary forms of arteriosclerosis ichthalbin (ichthyol albuminate) is indicated (one tablet three times a day), or iodotropon (one tablet twice a day).

For dyspnea, venesection, nitrite of amyl, tincture of aconite (gtt. ii

to x), belladonna or atropin, or morphin (gr. ¼ subcutaneously) is to be employed.

In *insomnia with dyspnea,* we may try, in addition, cannabis indica (gr. ½) at bedtime; hyoscin (gr. 1/100) at bedtime; or nitroglycerin (gr. 1/100 to 1/50) three times a day.

℞ Codein ..... gr. i 0,06
Urethan ..... gr. xxx 2,0
M. S.—Take at bedtime; also Bromural (gr. x to xx) at bedtime.

When the urine is scanty we administer diuretin (gr. xv) five times a day, and other diuretics.

As arteriosclerotics have a smaller working capacity, undue strain must be eliminated.

Organo- and serotherapy probably act by suggestion; however the administration of a few grains of thyroid gland given twice a day for a week or two has shown good results in some cases. Radium therapy, as offered in a properly conducted sanatorium, has been followed by marked and lasting improvement in cases not too far gone.

Thrombo-angiitis obliterans and Senile Gangrene

The term *thrombo-angiitis obliterans* was proposed by L. Buerger in 1908 for cases of pre-senile gangrene, formerly described under the name of *endarteritis obliterans.* The lesions are the result of thrombotic processes followed by organization and canalization of the occlusive clot. Purulent foci are developed suggesting the presence of some specific poison or some microbial agent at present unknown. The occluding process is attended with migrating thrombophlebitis with or without active symptoms.

Objective Signs.—The objective signs are: pulseless vessels, erythromelia, blanching of the elevated limb, cold and blue toes, pain in the calf of the leg brought on by walking, cutaneous nodosities, etc.

Treatment.—Hot air and diathermia treatment, described below, should be tried before surgical measures are instituted.

The electrodes[1] are placed in two basins which are partly filled with salt water of about 90 degrees. The water has the double purpose of improving the contact and keeping the electrodes cool. The patient, then sitting in a chair, puts one foot in each basin. The current goes through both extremities and the pelvis. Shortly after the current is turned on, the patient feels a distinct warmth in his ankle regions as the density of the current is the greatest in the narrowest part. Only about five hundred to seven hundred milliampères can be used and the patient soon complains of an intense ache about the ankles and

[1] Dr. H. F. Wolf, New York.

the strength of the current must be decreased to about three hundred to four hundred milliampères. Each treatment should last about twenty-five to thirty minutes.

Hypodermic Injections of Ringer's Solution in Thrombo-angiitis obliterans.—Koga (1913) reported thirteen cases of this disease treated by hypodermoclysis of Ringer's solution, on the basis of Mayesima's theory of increased viscosity of the blood, and noted improvement in every case. This procedure has been employed extensively in this country.

Dr. Willy Meyer of New York[1] concludes from his experience with this malady that conservative treatment should be resorted to before amputation in typical cases. He advises superheated air, best combined with systematic hypodermoclysis of Ringer's solution, and, if these measures fail, what one may call the conservative operation of ligation of the femoral vein or arteriovenous anastomosis. Superheated air may bring about an improvement in the symptoms, but seldom a lasting beneficial effect. The systematic hypodermic injection of 400 to 500 c.c. of Ringer's or of physiological salt solution daily, or every second or third day, deserves a place, he says, in the treatment of thrombo-angiitis obliterans. Even the further progress of gangrene may be stayed by hypodermoclysis, old and obstinate ulcerations may heal, and otherwise uncontrollable pain can be relieved. A simultaneous administration of organotherapeutic preparations deserves a careful test.

Fig. 129.—Symmetrical Gangrene (Fourth Day). Remains of old varicella lesions are also shown (Dr. A. L. Hoyne, Chicago, Ill.).

Inflammation of the wall of the arterioles or venules is apparently responsible for the thrombosis. It is possible also that an altered quality of the blood may contribute to the occurrence of the thrombosis and subsequent gangrene. If this is so, measures which tend to reduce the coagula-

[1] *Med. Rec.*, May 27, 1916.

bility of the blood within the body, Willy Meyer says, deserve to be tried, and therefore intravenous injections of anticoagulating substances, such as a two per cent water solution of sodium citrate, may prove to be a useful adjuvant to systematic hypodermoclysis.

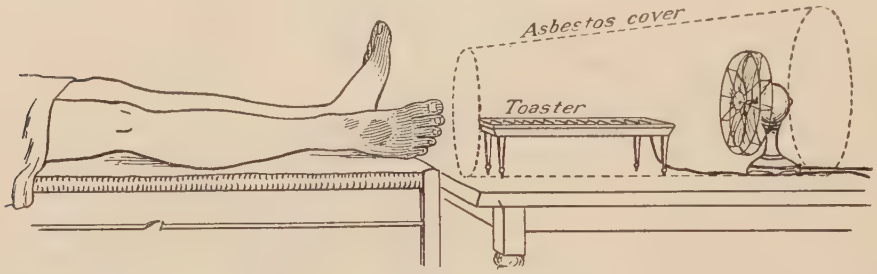


Fig. 130.—Home-made Apparatus for Treatment of Gangrene by Hot Air. The air current, directed by the electric fan, is heated in passing over the electric toaster. A sheet of asbestos covers the apparatus. Temperature 150° F. (W. G. Thompson, Med. Rec., Dec. 23, 1916.)

Surgical Treatment.—Surgical treatment consists in amputation or vessel anastomosis.

Phlebitis

(*Inflammation of Veins*)

This may be simple or septic and spreading. The simple variety may terminate in resolution or turn into an abscess.

Symptoms.—The superficial veins are hard and tender to the touch (thrombosis) and surrounded by red inflamed tissue or by collateral edema.

Causes.—Gout and syphilis are frequently underlying causes; injury and undue pressure are exciting causes.

Venous thrombosis (marastic) is observed in all forms of cachexia as a complication.

Treatment.—Rest, elevation of the limb, cold lead lotion applied by compress, an ice bag to the inflamed region, free catharsis, and light diet. If suppuration is evident, a free incision is indicated.

The *septic, or spreading, variety of phlebitis* is a dangerous malady according to its location. Thus, in sinus phlebitis following otitis media or mastoid operations or in septic phlebitis of the pelvis following childbirth the prognosis is grave. Phlebitis of this nature may terminate in fatal embolic pyemia. The *treatment* is symptomatic and surgical.

Varicose Veins and Venous Thrombosis

Varicose veins are common in the rectum (hemorrhoids), the scrotum (varicocele), and the lower extremities. The varicose condition is due to

increased venous pressure and changes in the walls of the vessel. Hemorrhoids and hematocele of the scrotum will be discussed elsewhere.

Varicosities in the lower extremities produce fatigue, cramp, swelling, pain, and numbness in the affected limb. Occasionally a vein ruptures and a brisk hemorrhage follows, which is readily controlled by compression. Venous thrombosis may set in and the whole leg become edematous and inflamed. Venous thrombosis is a frequent complication in cachexia from any cause.

Treatment.—For simple varicosities we order a daily morning dose of salts in warm water, and advise the patient to wear an elastic stocking or apply a rubber bandage three inches wide and five yards long from the toes up, and *over* a thin long stocking with the toe end cut away. If inflammation sets in and the vein becomes hard and painful, the limb must be elevated and cold lead water applied for a day or two. In very obstinate cases a radical cure by ligation and incision or excision may be attempted.

Aneurism

An aneurism is a blood tumor having for its walls a dilated artery or communicating with an artery. It is formed by the yielding of one or more of the coats of a blood vessel in consequence of injury or strain or from tissue degeneration, as we find it in alcoholic or syphilitic individuals or in those suffering from arteriosclerosis to such an extent that the artery does not stand blood pressure. Embolism of a blood vessel with subsequent inflammatory changes and weakening of the arterial wall beyond the embolus is another cause of aneurism.

The exact structure of an aneurism cannot be made out by an external examination. The form and size can be approximately determined by palpation and percussion, etc. We speak of a *fusiform, sacculated,* and *dissecting aneurism.*

Symptoms.—Pain and pulsating and expansile swelling. The pulse is delayed and diminished in force on the diseased side. A murmur may or may not exist.

Pressure effects are erosion of bone, enlargement of superficial veins, local edema, nerve paralysis, husky voice and aphonia from pressure paralysis on recurrent nerve, and dysphagia and dyspnea from obstruction of the esophagus and trachea, according to location.

An aneurism may rupture suddenly or leak into the surrounding tissue or undergo spontaneous cure, in which event there is usually a decrease of pulsation and of the size of the swelling.

Differential Diagnosis.—In an abscess or tumor over an artery the pulsation is not expansile and the swelling is not influenced on compressing the artery above. A carotid aneurism may be distinguished from an en-

larged thyroid gland by the gland moving with the larynx in swallowing. When the physical signs are not conclusive, an exploratory needle puncture may be made.

Aneurism of the Aortic Arch

Symptoms.—The rational signs of aortic aneurism are: pain, steady or in paroxysms, reflected to neck or arm, dry cough, dyspnea, noisy respiration, hoarseness, aphonia, dysphagia, difference in pupil, dilatation of surface veins or edema of head and arm, an impressible fluctuating expansile tumor, dull on percussion with or without systolic thrill or murmur, or double murmur.

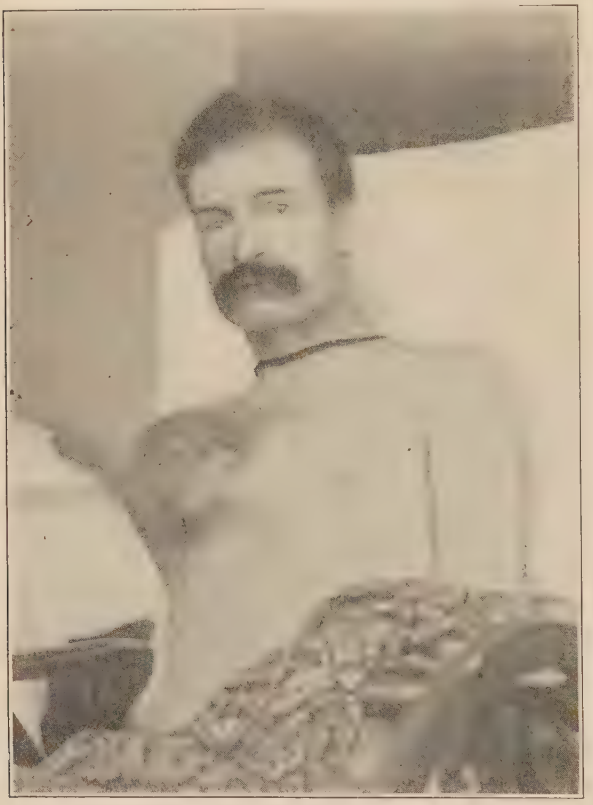


Fig. 131.—Traumatic Aneurism.

Percussion is negative excepting in aneurism near enough to the chest wall to give dullness. There is usually a difference in the radial pulse. In aneurism of the descending portion of the arch, pressure is exerted against the dorsal vertebrae causing erosion and great pain and a tumor may appear posteriorly.

Differential Diagnosis.—In discriminating aneurism from mediastinal tumor, pulsating empyema, aortic insufficiency, neurotic pulsation of aorta, displaced heart, a careful clinical history and examination will establish the diagnosis by exclusion. Aneurism of the aorta may develop and expand posteriorly between the roots of the lungs and compress a bronchus to such an extent that the lung becomes atelectatic and dull on percussion and hides the thrill and murmur of the aneurism.

Aneurism of the Abdominal Aorta

Symptoms.—The rational signs are pain, vomiting, epigastric pulsations, a tumor which pulsates occasionally, and a disturbed rhythm of the

femoral pulse. A bruit may be present or absent. The aortic pulsation in hysterical women must not be mistaken for aneurism. In a psoas or lumbar abscess there is no thrill and no bruit.

Prognosis.—The prognosis is not so serious as in aneurism of the aortic arch.

Aneurism of the Splenic Artery

This gives symptoms akin to those of gastric ulcer—pain and hematemesis. The diagnosis is very difficult unless it were possible to recognize

FIG. 132.—ANEURISM WITH NECROSIS AREA. (Dr. R. McNair, Kalamazoo, Mich.)

a pulsating tumor in the left hypogastrium by physical signs or by means of the fluoroscope.

Arteriovenous Aneurism

Arteriovenous aneurism presents no special clinical phenomena.

Prophylaxis and Treatment of Aneurism

Prophylaxis.—Plain living, avoidance of syphilis and of overstrain are rational preventive measures as regards aneurism.

Treatment.—The treatment of an accessible or external aneurism is surgical—by ligature or excision or both. If pressure can be applied between the aneurism and the heart it may be tried before operating.

The symptomatic management comprises digital pressure, a tourniquet, a bag of shot, rest in bed, cold to the sternum, iodid of potassium and arsenic internally, subcutaneous injections of gelatin (40 injections of 5i each), galvanopuncture, repeated venesection, and occasional morphin injections to quiet pain.

Visceral Neuralgias in Circulatory Disturbance Simulating Other Disease

Hepatic congestion with pain or tenderness in the liver and visceral neuralgias in the intestines and spleen simulate local trouble, such as hepatic abscess, appendicitis, or tubal disease. Valvular heart lesions are

Fig. 133.—Pulsating Aortic Aneurism.

sometimes associated with excessive menstrual flow, and sometimes with amenorrhea.

Women with heart disease, endometritis, and metrorrhagia combined have suffered serious operations for supposed malignant disease when a mild curettage and a few doses of digitalis or strychnin and opium would have sufficed to make them comfortable.

Section X

Prevention and Treatment of Kidney Insufficiency and Ailments in the Genito-Urinary Tract (Male and Female)

For Syphilitic, Tuberculous and Malignant Diseases of the Genito-urinary Tract *see* Section V.

Introductory Remarks

Clinical Pathology.—The pathology of the genito-urinary tract includes congenital defects, traumatism and its sequelae, infection, and parasitic invasion. The genito-urinary tract is frequently the seat of benign and malignant new-growths or of concretions and foreign bodies. Kinking and compression of the ureters may give rise to retention phenomena, and the kidney may become loose in its attachment, and such displacement may be followed by various disturbing conditions or reflex symptoms. Pregnancy occasionally gives rise to disturbances in the genito-urinary tract, and functional derangements are very common.

Infection of the genito-urinary tract may occur in various ways. Microörganisms in the circulation may pass out through the kidneys and leave them intact. Infection of one segment of the urinary organs may spread upward or downward to other segments and to adjoining tissues, as in tuberculosis and gonorrhea of the genito-urinary tract.

Primary disease of a calyx may infect the *bladder* through the agency of the *ureters* and spread to the *pelvic contents.* Primary disease of the *kidneys* (tuberculosis) may infect all the lower urinary organs. Infection of the bladder may take place through the urethra, naturally or by catheter. *Stagnation of urine,* in consequence of stricture, paralysis, or a hypertrophic prostate, may result in *back pressure* and in *ammoniacal fermentation* with the production of sulphuretted hydrogen, which may become absorbed and act as a systemic poison or irritate the mucous membranes locally. *Urinary concrements* (*stones*) may form anywhere composed of

urates, uric acid, oxalate of calcium, or *earthy salts* joined by *mucous* or *albuminous substances. Uric acid concrements* are found in the kidney even in the newborn. The pathology of the uric acid diathesis will be discussed under Gout. Regarding *oxalic concrements* and those of *cystin* and *xanthin* we have no definite knowledge. *Phosphatic concrements* are apt to form when the urine becomes alkaline.

Pain is a prominent symptom of most genito-urinary troubles and when present is a valuable guide as to the locality of an ailment, *particularly as to which side is affected.*

Waste products in the blood are eliminated in the urine, and all substances which the kidneys secrete are in solution in the urine; therefore the condition of the urine depends largely upon the condition of the kidneys and of the blood flowing through them. The total *solids* in the urine vary from 3 to 12 per cent, and the quantity of *urea* secreted is in direct proportion to the quantity of blood passing through the kidneys and in conformity with the food ingested.

The quantity of water secreted is dependent on its supply and on the blood pressure and the state of the capillaries in the kidneys. Thus, in cardiac disease with simple albuminuria we can rely upon the diuretic action of digitalis so long as the kidney epithelia are not completely degenerated. All drugs which increase arterial pressure are diuretics, as also are a number of easily diffusible salts.

Normal blood pressure with vasomotor dilatation of the kidney capillaries is the probable explanation of *polyuria.* The relation of the heart and kidneys is very intimate. A weak left ventricle with low arterial pressure reduces the urine in quantity. Venous pressure in the kidney may become increased by inertia of the right ventricle or from local causes in the kidney itself.

A general acute inflammation of the kidney or inertia of both sides of the heart, with low arterial and high venous pressure, as in heart disease, reduces the secretion of urine to a minimum. Finally, a decrease of urine is observed when there is *vasomotor constriction* in which the kidneys also participate, as in *asphyxia, strychnin poisoning,* and *epileptic and eclamptic seizures.* When the secreting epithelia suffer transitory or permanent changes, albumin shows in the urine.

The urine is diminished (concentrated) when quantities of water leave the body by other routes, as in sweating, diarrhea, etc., and the quantity of urine secreted will vary according to the degree of the change in one or both kidneys. The lumen of the uriniferous tubules is gradually diminished and obliterated by a local inflammatory process. When the resistance is equivalent to 60 mm. of mercury the secretion of urine ceases, but before this takes place the kidney becomes edematous (hydronephrotic and finally atrophic). When the ureters are periodically occluded, the kidney parenchyma suffers but little, and large hydronephrotic sacs are formed by

dilatation of the calices. Thus, clinically, we observe kidney lesions secondary to various diseases, also primary, such as acute and chronic parenchymatous degeneration by reason of infection and irritation. Ultimately complete atrophy and retraction occur, with total abeyance or loss of function.

The average daily amount of urine passed by an adult is from 33 to 40 ounces, and in the case of a child, its age in years, *doubled,* will approximately give the number of ounces per diem. The urine increases in quantity as the individual takes large quantities of fluids; it decreases on diminished consumption of fluids or loss of fluid by perspiration and diarrhea.

Polyuria is found in neurotic individuals and in true diabetes, also in chronic interstitial nephritis and in other conditions. The urine varies in color and has a specific gravity of about 1,020. The normal average daily quantity of urea excreted by an adult amounts to about 30 grams (a little more than an ounce). A clear insight into the disease conditions of a patient is impossible without a knowledge and examination of the urine. We investigate its specific gravity and look for albumin, sugar, bile, blood, pus, casts, etc. Hyaline casts may be found in almost any febrile condition and are not of grave import. In children, a severe nephritis with a smoky, bloody, and scanty urine showing albumin and blood casts may end in complete recovery if the heart remains intact. In gastroenteritis of long standing albuminuria and nephritis are often found as a complication, also in malarial disease. In tuberculosis of the genito-urinary tract the bacilli are not often found in the urine. Pus and blood in the urine may take their origin from any region of the genito-urinary tract and from perforation of a neighboring abscess into the bladder. The urine of one kidney may be collected separately by means of a catheter passed into the ureter by the aid of the cystoscope. Retention and suppression of urine are readily distinguished. Incontinence, slow urination, and frequent urination may be of central or local origin. Convulsive substances (paraxanthin and acetone) are found in the urine after attacks of eclampsia. Urine may be preserved for a long time by adding to it a few drops of chloroform.

Systemic Poisoning from Kidney Insufficiency

The kidneys act as guardians and eliminators to the blood, and a diminution of their function will result in an abnormal condition of the blood. Uremia with somnolence, convulsive seizures, vomiting, blindness, paralysis, and disturbances of the heart and respiratory function, with or without fever, are due to kidney insufficiency. We look upon such phenomena as an evidence of systemic poisoning (for urea, uric acid, potassium salts, and creatin are nerve poisons), but we are unable to explain why in certain

instances anuria of several days may persist without uremic symptoms. The diseased kidney itself throws poisonous substances (hypoxanthin and acetone) into the circulation, which thus irritate the vital and motor centers. Many experiments regarding the toxicity of urine have been made without any definite results.

Renal insufficiency is the evil result of all inflammatory processes in the kidney which do not end in *restitutio ad integrum,* and all our prophylactic measures must be directed toward warding off this serious condition.

Nephritis is liable to be induced by acute and chronic infections, exogenous, or endogenous, arising in the intestine. Suppression of the eliminative function of the skin (intense cold, burns, eczema) is an etiological factor. Pregnancy also increases the liability to kidney insufficiency. Chemical irritation due to the ingestion of artificially preserved foods or resulting from therapeutic dosage with chemicals, is another possibility.

Mercuric bichlorid arsenic, potassium chlorate, lead salts, phosphorus, alcohol, turpentine, may excite nephritis and must be *cautiously prescribed.*

Infection of the bladder may take place from above or from below. Prostatectomy versus catheter life must be carefully considered in older people, as also pregnancy in individuals whose kidneys are already inefficient.

We have but little positive knowledge of the underlying factors of stone or gravel formation in the genito-urinary tract and how to guard against it and its sequelae.

Venereal infection, on the other hand, is well understood at the present time and *local prophylactic measures* have given a high degree of good results. In the female pregnancy is beset with many avoidable complications and dangers, and gonorrheal infection and its sequelae is a sad chapter in the history of civilized peoples. Neurotic disturbances in the female genital sphere must be met with the utmost conservatism as regards operative treatment.

General Principles of Treatment

Rest, climate, hydrotherapy and elimination through the bowel and cutis are foremost in the treatment of patients with kidney insufficiency. Restriction of fluids and of sodium chlorid and of certain foodstuffs are important considerations. Venesection and drug treatment for hypertension and uremia have their distinct indications. Vaccine treatment is in the experimental stage. Also our therapy will be somewhat influenced by our conception of whether kidney insufficiency be primary or secondary to circulatory insufficiency.

In the writer's experience a high uric acid index in the blood is a danger sign as regards subsequent kidney insufficiency, and necessitates determined efforts toward elimination.

Anomalies of Urinary Secretion

Hematuria

Definition.—*Hematuria* is the mixture of blood with urine.

Causes.—The causes may be placed in four groups:

1. *Remote Causes.*—Acute fevers, as malaria, smallpox; poisons, as turpentine, carbolic acid, mercury or cantharides; diseases that alter the blood, as scurvy, hemophilia, purpura, jaundice.

2. *Renal Causes.*—Congestion, inflammation, new-growths, stones, parasites, infarcts, varicose veins in pelvis and kidney, tuberculosis of kidney.

3. *Urinary Passages.*—In the *ureter,* stone, inflammation, new-growths; in the *bladder,* similar causes may operate, as also in the *prostate* and *urethra.*

Hemorrhage from the urethra usually precedes the flow of urine and also recurs between the acts of urination, but if it does not it may be squeezed out by stroking the urethra.

(*a*) Acute gonorrhea, a mild hemorrhage may occur in any case.

(*b*) Acute posterior urethritis presents only terminal hematuria.

(*c*) Chancre within the urethra sometimes causes hemorrhage that may be obstinate and recurrent.

(*d*) Neoplasms and injuries to the urethra sometimes cause a hemorrhage that may be alarming.

4. *Traumatic Causes.*—Blows, falls, instrumentation, injury at operation or labor.

The blood may be macroscopical or microscopical. In many cases the history will help to determine the cause. The amount of bleeding of course may be slight or sufficient to cause death from anemia. Rest is then of primary importance and steps should be taken to determine the source of the hemorrhage.

This may be done by systematic catheterization and examination with a cystoscope, as in the determination of the source of pus in urine.

Treatment.—Traumatic causes are practically the only ones necessitating direct treatment of the bleeding point, as in rupture of the kidney, when nephrectomy may be indicated. Bleeding areas that can be reached through the endoscope may be treated with applications of adrenalin chlorid or thromboplastin.

Stones, new-growths and inflammations should receive the proper treatment.

When no cause can be found, the treatment is symptomatic: Rest in bed, cold to affected area, reduction of blood pressure, and morphin if there is pain or restlessness. Calcium chlorid may be administered to

increase the coagulability of the blood. Transfusion of blood serum or whole blood may be indicated.

Hemoglobinuria

Definition.—Hemoglobinuria is the presence of blood pigment in the urine which has the color of Burgundy red wine.

Clinical Forms.—It is divided into two general classes:

1. Toxic hemoglobinuria caused by chemical poisons, as carbolic acid, potassium chlorate, carbon monoxid; or by acute infectious diseases, as scarlet and yellow fevers, typhoid, malaria and syphilis.

2. Paroxysmal hemoglobinuria.

Treatment.—The treatment of toxic hemoglobinuria must be directed to the causal factor.

In paroxysmal hemoglobinuria attacks may be prevented by avoiding exposure, or by removal to a warm climate. Chvostek recommends amyl nitrite to abort attacks. Rest and fluid diet are necessary during an attack, but beyond that little can be done. A blood test for syphilis and chronic malaria may reveal conditions which necessitate specific treatment.

Albuminuria

Etiology.—Albumin in the urine may be due to the passage through the kidneys of serum albumin, or its presence may be caused by contamination in the lower urinary tract by blood or pus from disease of the pelvis, ureter or bladder.

Congestion of the kidney, acute nephritis and organic disease of the kidneys show albuminuria as a rule. Albuminuria may occur without renal changes, as in functional albuminuria, the albuminuria accompanying fevers, and from the irritation of certain poisons—lead, mercury, ether and chloroform.

Vesicular Albuminuria

For the detection of vesicular albuminuria the three-glass test may be employed in a routine way. The patient passes the first half ounce of urine into a small glass, the bulk into a large glass and the last ounce into a third glass. The first urine voided will show the most albumin. The presence of blood and pus in urine obtained in this way should be determined by microscopical examination. Also it is necessary to know if these are present in quantity sufficient to account for the amount of albumin. The association with casts is important.

Diseased vesicles furnish globulin, albumin, pus and blood, all of which may be diffused through the urine in the bladder.

How shall we distinguish vesicular from renal albuminuria? Catheters in both ureters furnish urine free from vesicular contamination. This, however, should be done by an expert.

Postural Albuminuria

Postural albuminuria in children is occasionally observed. Testing the separate urines passed at different times of a day and the effect of standing fifteen to thirty minutes in marked lordotic position may clear up the diagnosis.

Prophylaxis and Treatment.—General invigorative treatment and medical gymnastics for the improvement of posture is the rational procedure in such cases. In *vagotonia* small doses of atropia (gr. 1/200) should be administered several times a day. The treatment of albuminuria in general is that of the underlying cause.

Pyuria

Definition and Etiology.—Pus in the urine, generally speaking, denotes inflammation in the urinary tract. Inflammation in the genital tract may contaminate a urine, especially in women; and again inflammation elsewhere in neighboring organs, as pelvic or appendicular abscesses, may contaminate the urine by fistulous communication.

Diagnosis.—The procedure then is to obtain a catheterized specimen from the bladder to rule out involvement of the genital tract and of the urethra. A cystoscopic examination will then reveal in many cases whether the bladder is responsible, or whether the pus comes from higher up. Specimens obtained by catheterizing the ureters will reveal whether the involvement is bilateral or unilateral; furthermore the specimens can be examined microscopically and bacteriologically. The existing organism can thus be determined and a vaccine made if advisable. Functional tests for relative and absolute efficiency may be done to determine the amount of involvement, and an x-ray picture will throw additional light on the diagnosis.

Treatment.—Treatment is that of the underlying cause.

Anuria

Definition and Etiology.—Anuria is the total suppression of urinary secretion.

It may occur under the following conditions: congestion from acute nephritis, blocking of both ureters by stones, or more rarely blocking of one kidney and reflex anuria in the other. Acute infections will cause suppressions, as yellow fever and cholera, or poisons, as phosphorus, lead and turpentine. Postoperative shock will cause it, but in such cases the probability of having cut or tied the ureters must be considered so that the damage may be repaired. Also anuria is said to occur in hysteria.

Treatment.—In managing a case presenting the symptom of anuria, it is essential first to catheterize the bladder, to make sure it is not after all

retention. The bladder being found empty, one must proceed according to the other symptoms and the antecedent history. If there is obstruction from calculi, operation is necessary to remove them. In non-obstructive cases cupping should be done and heat applied to the kidney region. Hot rectal irrigations are indicated and elimination by other channels increased by sweating and purging. If secretion starts, diuretics may be given. *Decapsulation* has been done for anuria.

Dysuria—Strangury

Dysuria and strangury are terms used to designate spasmodic and painful urination, and vesical tenesmus is often associated therewith. Irritating qualities of the urine, disorders of the bladder, the urethra, or the prostate gland, in women disease of the pelvic organs, and all inflammatory conditions of the lower intestine are the usual causative factors of dysuria.

Treatment.—Treatment is that of the underlying cause. Symptomatically we administer opium and belladonna by suppository.

Difficult, Slow, or Interrupted Urination

This condition is usually due to an obstruction in the urinary passages or to atony of the bladder and overdistention of this organ. Frequent micturition may be due to local irritation in the genito-urinary tract, as to stone or to chronic cystitis, to undue local treatment or to a purely neurotic state, with or without local irritation. The frequent dribbling of urine due to overdistention is readily recognized by an unusually large bladder dullness on percussion.

Treatment.—Treatment is that of the underlying cause.

Incontinence

Incontinence is the inability to prevent the escape of urine, as in paralysis of the sphincter muscle of the bladder. It is one of the important symptoms in disease of the brain and spinal cord and in the so-called typhoid state, but it is frequently a purely functional disturbance observed in neurotic individuals. An undue contraction of the detrusor muscles is also supposed to be the cause of incontinence. In fat women the mere act of coughing may produce incontinence, particularly when it is favored by mechanical conditions resulting from pelvic or perineal ailments. Some persons acquire the habit of urinating frequently because they have not far to go to the toilet room.

Treatment.—Incurable incontinence of central origin is met by wearing a urinal underneath the clothing.

Incontinence in Children

(*Enuresis*)

This condition is common to male and female children. The incontinence may occur during the day or the night, or both, and continue up to puberty, but seldom thereafter.

Treatment.—Local causes must first be looked for. Highly acid or highly alkaline urine should be neutralized and, if concentrated, diluted by administering fluids. If phimosis or an elongated or adherent prepuce or a narrow meatus is present, circumcision or meatotomy often corrects the disturbance. Irritation in the rectum from pin-worms or fissures will cause enuresis and demands correction. Stone in the bladder may be the exciting cause, also undescended testicle.

Sometimes no cause can be found and the cure resolves itself into a question of management. If possible the confidence of the child should be gained and parental scoldings eliminated. The child should be taught to empty the bladder at regular intervals during the day, endeavoring to anticipate the involuntary act. The intake of water should be limited in the afternoon and evening and the bladder emptied at bedtime. During the night the child should be awakened at intervals, to void, again to anticipate if possible the incontinence.

The diet should be simple but strengthening and free from irritating or stimulating extractives, spices and seasonings. General health should be promoted and strychnin administered if necessary.

Belládonna is the usual medicinal agent employed and may be given as the extract or in alkaloidal form. It should never be depended upon alone, but combined with efforts to overcome the habit by proper management.

Nocturnal Enuresis.—Add half a grain of thyroid (three times a day) to the usual treatment of refractory cases of bedwetting. It has been recommended as a successful remedy with no other associated drug treatment.

Retention of Urine

Retention of urine may be due to brain and spinal cord disease, to the typhoid state, to paralysis of the abdomen, as in peritonitis, to mechanical obstruction from an enlarged prostate or stone, or to simple hysteria. Retention of urine is one of the important vesical emergencies which must be overcome by catheterism, and in the event of its failure by suprapubic aspiration or by perineal incision. In catheterizing, the catheter and the hands of the operator must be thoroughly clean. The urethral orifice and its immediate neighborhood should be carefully wiped with a pledget of cotton saturated with a non-irritating antiseptic water (1 to 2,000 bichlorid of mercury solution or a 2 per cent formalin solution). In catheterizing no

force must be used, for fear of creating a false passage. (*See also* Section I.)

The following kinds of catheters are in use: soft gum catheters and silk woven gum elastic catheters, blunt and olivary pointed and flat. When an olivary catheter cannot be introduced, we may employ a whalebone filiform bougie, over which a Gouley tunneled catheter may be slipped. In some cases with prostatic hypertrophy we succeed best in entering the bladder by means of a Mercier catheter with a short beak. The ordinary *silver catheter* has a larger prostatic curve.

Chronic Retention of Urine in Children

This is occasionally observed, due to mechanical obstruction or neuromuscular spasm. Children so afflicted take a long time to urinate and have pain; they become anemic and flabby. On examination a globular mass is felt above the pubes which disappears on catheterization. Infection may supervene, pyonephrosis and pyelonephritis may develop.

Treatment.—Obstruction must be overcome mechanically or surgically (dilatation of the sphincter).

Rectal suppositories of hyoscyamus and belladonna are indicated in neuromuscular spasm.

Polyuria

Polyuria, improperly called *diabetes insipidus,* is a condition or syndrome not thoroughly understood. Some children, during the first two years of life, have polyuria in a marked degree without being otherwise ill. Adults with cardiorenal disease frequently complain of polyuria, as do vagotonics and adults with hysterical and neurotic tendencies. In organic brain diseases, particularly in brain syphilis, polyuria is a frequent symptom, and it is occasionally of purely traumatic origin.

Prophylaxis.—Direct prophylactic measures are out of question.

Treatment.—Management of polyuria is indicated by whatever knowledge of the underlying cause we may possess. In children otherwise not ill, simple polyuria requires no special treatment. In neurotics, mental control of polyuria is possible through suggestion. In cardiorenal disturbances and in brain syphilis, treatment appropriate to such conditions is indicated. In vagotonia, atropia in small doses may be administered several times a day.

Kidneys and Ureters

Congestion of the Kidneys

Forms.—Congestion of the kidneys may be active or passive.

Active Congestion.—*Etiology.*—Active congestion occurs in the first

stages of acute nephritis or may be due to the action of toxins in acute fevers or to chemical irritants.

Treatment.—Treatment consists in following the methods outlined in non-obstructive anuria, according to the severity of the case.

Passive Congestion.—*Etiology.*—Passive congestion results from disturbances in the circulation from cardiac and pulmonary diseases. These should receive the proper treatment. Passive congestion also is caused by pressure from tumors, from the pregnant uterus and from collections of fluid.

Treatment.—The treatment is removal of the pressure when possible.

Acute Nephritis (in Adults and Children)

Etiology.—Acute nephritis is caused by exposure, by the toxins of acute fevers—especially scarlet fever, by chemical irritants, turpentine, carbolic acid, etc., by the toxemia of pregnancy, or it may follow extensive burns.

Prophylaxis.—The discussion of prophylactic measures will be confined to the warning that careful observation of the urine should be made during pregnancy and during the course of the fevers which are prone to excite kidney changes. The transient presence of albumin and casts or its persistence will tell whether one is dealing with a febrile albuminuria or with an acute exudative or productive nephritis. If then the kidneys are damaged, a longer period of rest must be enforced and proper diet prescribed. Moreover the patient can be made to appreciate the dangers from subsequent exposure and errors in living and so guard against whatever might excite an exacerbation or operate to produce progressive structural changes in the kidneys.

Treatment.—The indications to be met in acute nephritis are: rest for the kidneys, elimination of waste products and treatment of symptoms.

Rest for the kidneys is favored by diet and rest of the patient, thereby reducing tissue waste.

Diet.—If a patient receives sufficient milk to support nutrition, the amount of fluid to be eliminated will defeat the attempt to spare the kidneys. At the same time the excretion of fluids favors the washing out of the kidney tubules. Naturally a happy medium suggests itself. Nutrition can be maintained by fats and carbohydrates when retention warns that the ingestion of fluids is too great. Fat in the form of cream, and carbohydrates, as oatmeal jelly, rice, farina and arrowroot, are allowed.

As the quantity of albumin decreases and the urinary output increases, the nourishment can gradually be made more liberal. Cream can be added to the milk first, then soup with rice or barley; later zwieback, and bread and butter, then green vegetables and fruit can be added.

Resumption of Activity.—The resumption of activity must also be

gradual and governed by the relation between albumin and the quantity of urine.

Elimination of Waste Products.—Stimulating the activity of the bowels and skin performs the double office of resting the kidneys and ridding the system of waste products that would embarrass renal function.

The energy with which cathartics should be administered depends on the amount of retention, as evidenced by dropsy. Daily evacuations by salines are necessary under the most favorable conditions. With the advent of dropsy or uremic symptoms, the hydrogogue cathartics should be administered—as jalap and elaterium. Elaterin is useful as it may be given hypodermically when the stomach is intolerant.

Activity of the skin is promoted by hot-air baths and hot packs. Pilocarpin should be used with caution and is indicated when the necessity for diaphoresis is urgent and hydrotherapy fails.

Treatment of Symptoms.—In regard to the treatment of symptoms, nausea and vomiting may interfere with the taking of nourishment and fluids, so that feeding may be done for a day or two by rectum, or if there is diarrhea as well, saline may be given by hypodermoclysis.

Suppression must be treated according to the principles outlined under Anuria. Uremia and heart complications will be discussed under Chronic Nephritis.

The anemia caused by nephritis generally demands the administration of iron, when convalescence is well established. Blaud's pills or tincture of the chlorid of iron may be given with due regard to their effect on the gastro-enteric system.

Chronic Nephritis

(*Chronic Bright's Disease*)

Management.—How shall a patient be managed in whom it is known that pathological changes exist in the kidneys? The practical management of chronic Bright's disease depends on function. In a well equipped hospital, the nephritic test meal, the blood nitrogen determination, and the phthalein test are employed to establish the degree of renal function. In general practice the *phenolsulphonphthalein* test is a short-hand functional test not difficult to accomplish, as follows:

The patient swallows 1 c.c. phenolsulphonphthalein solution which contains 6 milligrams of the drug. A rubber catheter is then slipped into the bladder, and in about fifteen minutes the first trace of the test reagent will make its appearance. This test is a color test, and the urine should be compared with a standard solution.

In the first hour, from 40 to 50 per cent of the reagent in the normal output.

In the second hour, from 20 to 30 per cent of the reagent in the normal output.

Lower figures denote renal insufficiency.

Classification.—A practical classification of chronic nephritis has been offered by Dr. F. C. Janeway of Baltimore, as follows:

1. Albumin and casts in the urine as the only evidence of nephritis.
2. Hypertension with or without albumin. Slight subjective symptoms.
3. Hypertension with myocardial insufficiency.
4. General edema with myocardial insufficiency.
5. Advanced renal insufficiency with uremic symptoms.

General Plan of Treatment.—The *first group* calls for safeguarding treatment, viz.: avoidance of overstrain of a weakened function, reduction of spices, salt, general hygiene.

The *second group* involves safeguarding treatment: reduction of meat intake, no bulky meals, no mental or emotional strain.

The *third group* calls for rest, the Karell diet or a limitation of fluids, salt and nitrogen, and treatment of cardiac insufficiency (edema-dyspnea) with digipuratum and nitroglycerin.

In the *fourth group* hot-air baths are salutary in addition to diet and medication.

In the *fifth or end stage* a very low nitrogen diet is called for—and sweating, bleeding. Sodium nitrite and chloral hydrate for insomnia.

Safeguarding Treatment and General Management of Nephritis

It is a simple thing to prescribe removal to a mild, dry, equable climate, but in many cases this advice is impossible to follow. Rules must be laid down to prevent, so far as possible, progressive changes in the kidneys and the occurrence of exacerbations.

Coffee, tea, alcohol and tobacco are not to be permitted. Their effect on the heart should be considered as well. Condiments and spices are not desirable and nitrogenous food must not be taken in excess. Meat once a day and eggs may be allowed if they are found to be harmless. Light meals, and frequent ones, are desirable. Fluids should not be so excessive as to overtax the circulation: two to three quarts a day is about the maximum, and half of it may be taken as milk.

Exercise should be moderate and regulated in accordance with the circulatory symptoms. Freedom from worry and anxiety is desirable.

Symptoms must be treated as they arise.

Increase in arterial blood pressure is benefited by rest and diet, but vasodilators may be necessary—as nitroglycerin and the iodid of potassium.

Thyroid treatment has been recommended in chronic nephritis and from reports published it deserves further trial.

Epinephrin in Treatment of Nephritis.—Borelli [1] reports two cases of acute and one of chronic nephritis in which remarkable benefit was realized by epinephrin treatment. One patient was a child nearly 5, the others men of 50 and 62. He gave the child sixteen drops a day of a 1 to 1,000 solution of epinephrin, four drops at four hour intervals. The adults were given forty drops a day, eight at a time. Ercolani called attention in 1910 to the benefit from epinephrin by the mouth in nephritis, commending the harmlessness, ease and efficacy of this method of treating kidney disease, which has proved its usefulness again and again, and Borelli's experience has confirmed his statements.

Mercury in Treatment of Nephritis.—If the Wassermann test is frankly positive in an individual suffering from kidney insufficiency, antiluetic treatment may effect improvement and cure.

Myocardial insufficiency is combated with digitalis and strychnin.

Edema is treated by promoting elimination from the bowels and skin, by cardiac stimulation and by the mechanical removal.

Uremia.—With the appearance of uremic symptoms, efforts must be made to stimulate elimination by the skin and bowels—the hot air bath for diaphoresis, catharsis for the bowels. Elaterin may be given hypodermically (gr. 1/50 to 1/10), or croton oil dropped on the tongue. Hot colon irrigations of saline may also be given.

Toxic material may be removed from the blood by venesection—ten to twenty ounces may be taken. The volume can be restored by intravenous infusion or by hypodermoclysis or transfusion.

Restlessness and delirium may be controlled by chloral per rectum or morphin hypodermically.

Convulsions are controlled by chloroform, aided by chloral or morphin if prolonged.

Arterial tension is reduced by hypodermics of nitroglycerin.

If coma intervenes, the efforts to promote elimination must be more strenuous, and pilocarpin may be given to increase diaphoresis.

Cardiac activity should be supported by digitalis and camphor.

The Surgical Treatment of Acute and Chronic Nephritis and Uremia

Acute renal infection is occasionally so intense as to lead to a rapid and fatal termination. When renal tension can be relieved in no other way, an incision through the capsule of an acutely inflamed kidney is indicated and may establish a cure. Reginald Harrison, of England, has reported since 1896 a number of such cases and cures.

The proposition to treat chronic nephritis surgically was first made by Dr. G. M. Edebohls, of New York, in April, 1899, after various observers, including himself, Rose, Ferguson, and Newmann, had noticed the dis-

[1] *Policlinico,* Rome, April 16, 1916.

appearance of albumin and casts from the urine after operations upon the kidney.

Nephritis following acute infectious diseases in children has a tendency to complete recovery. Children who survive the acute stage, but continue to show albumin and casts for several months, also make a complete recovery in the majority of cases. In a small percentage of cases recovery does not take place.

Patients who are affected with nephritis following diphtheria, scarlatina, measles, or malarial disease in early life may not entirely recover. Kidney insufficiency with uremic symptoms and convulsions may develop at any age and is frequently manifested at the time of the first confinement.

In view of the uselessness of medication in chronic nephritis, the physician is justified in advising inspection of the kidney through a lumbar incision in cases in which an acute nephritis, not secondary to heart lesions, does not clear up in from six months to a year, and in suggesting decapsulation of one or both kidneys if they appear swollen and enlarged. For detailed information on this subject the reader is referred to Dr. Edebohls's monograph, "The Surgical Treatment of Bright's Disease," 1904.

Pyelitis

Definition and Etiology.—Pyelitis is a catarrhal or suppurative inflammation of the epithelium lining the pelvis of the kidney, accompanied by an irregular fever. Pyelitis in infancy can occur without a perceptible rise of temperature.

The inflammation may be caused by chemical agents but more often by bacteria, through the blood stream from neighboring organs, or more rarely by ascension from the lower urinary tract. Usually there must be a contributing cause that damages the mucosa or prevents drainage. Pressure of tumors, including the pregnant uterus, the presence of a stone or a stricture of the ureter, kinking of the ureter from abnormal mobility of the kidney, are all predisposing factors. The exciting organisms may be the colon bacillus, streptococcus, staphylococcus, typhoid bacillus or pyocyaneus.

Treatment.—In the acute stages rest is essential. The diet should be liquid, including plenty of water.

Urotropin is given in full doses; forty to fifty grains per day may be given, in combination with the acid sodium phosphate (gr. xv) three times a day. Sometimes the disease responds promptly to the use of potassium citrate through rendering the urine alkaline.

If the urine does not clear up, lavage of the kidney pelvis by means of the ureteral catheter has been practiced. Saline is first injected to cleanse the pelvis, and this is followed by irrigating with one of the silver salts—

silver nitrate (1 per cent) or argyrol (20 per cent). Local treatment should be a *dernier ressort.*

The exciting organisms should be isolated and *vaccines* made and administered.

In pyelitis of pregnancy it is seldom necessary to induce labor, and the above procedure can be carried out. In addition the patient should lie on the unaffected side to relieve the pressure of the pregnant uterus.

In children pyelitis is not uncommon and occurs as a complication of other diseases, of lowered vitality, and often with no discoverable cause or antecedent condition. It is often mistaken for typhoid or malarial fever.

Local treatment is not practical, and dependence must be placed on the administration of urotropin and diuretics in combination with vaccine treatment. The pelvis may be flushed out from above.

Pyelonephritis

Definition.—Pyelonephritis is an inflammation of the kidney substance usually associated with involvement of the pelvis.

Causes and Treatment.—The causes are similar to those of pyelitis, and in the milder cases the same lines of treatment are to be followed; that is, removal of the cause if possible, rest, diet, urinary antiseptics, lavage and autogenous vaccines.

These measures failing, the question of nephrotomy or nephrectomy must be considered, due regard being paid to relative and total renal function.

Hydronephrosis

Definition.—Hydronephrosis is a dilatation of the kidney and pelvis with the accumulation of non-purulent fluid.

Causes.—The causes are partial obstruction or intermittent total obstruction. These may be from causes within the urinary tract, as stones, or new-growths, strictures of the ureter or kinking of the ureter from movable kidney. Pressure from without may cause hydronephrosis, as tumors, the pregnant uterus, or inflammatory bands and adhesions.

Treatment.—The indications for treatment are the relief of symptoms and the removal of the obstruction before the kidney becomes damaged, or infection takes place.

If functional tests prove a kidney to be almost entirely destroyed, or wholly so, removal is indicated, if the other kidney is competent; otherwise the kidney should be preserved and the obstruction removed.

Sometimes immediate operation is not practical, and, as in acute cases of hydronephrosis, the relief from discomfort and pain is the indication to be met. This can be accomplished by rest, and opiates and drainage of the sac. Sometimes posture and manipulation, as in a movable kidney,

will accomplish this purpose. In certain cases a ureteral catheter can be passed to the sac and relief afforded in this way.

Aspiration of the sac may be done by puncture through the superior lumbar triangle and in some cases will give permanent relief if the obstruction is only temporary.

Pyonephrosis

Definition and Etiology.—Pyonephrosis is an inflammation of the kidney where there is accumulation and distention with pus. The element of obstruction is an operating cause. Pyonephrosis may result from pyelitis or pyelonephritis, plus obstruction or from hydronephrosis plus infection.

Treatment.—The treatment is surgical.

Perinephritic Abscess

Etiology.—Inflammations in the capsule and fatty tissue surrounding the kidney may be secondary to renal infections, or neighboring structures, as the appendix, liver or gall-bladder. It may result from infected hematoma following trauma, and it sometimes occurs as a complication of acute infectious diseases.

Treatment.—The treatment is surgical incision and drainage, with attention to the primary focus.

Movable Kidney

Definition.—Movable kidney, floating kidney, or nephroptosis, is a condition said to exist when this organ has an excursion beyond the physiological limits normally taking place with respiration and change in posture.

Etiology.—Its causes are many—some disputed. Probably in most cases more than one etiological factor is operating. Among the causes must be mentioned the peculiarities of dress of modern women, tight lacing, high heels, etc., loss of perirenal fat, especially from rapid wasting, relaxation of the abdomen following childbirth. Anything which increases the weight of the kidney, as tumors, stones, etc., may favor its mobility. A certain number of cases may be congenital, and there is a peculiar type of anatomical structure, long waisted, narrow-chested individuals in whom movable kidney is said to be common (asthenia universalis).

Treatment.—Movable kidneys that do not give symptoms do not need treatment, and the patient should be kept in ignorance of the condition. If symptoms are present some support is necessary to hold the organ in place. This may be done by surgical fixation, but mechanical means often give complete relief. A properly fitting abdominal support should be worn. If necessary a pad to hold up the kidney can be combined (*see* Enteroptosis), but it must not cause undue pressure. The patient should be instructed how to put on the support, first reducing the kidney. In

addition, if there is loss of fat, the nutrition must be improved. Massage and exercise are necessary for relaxed and flabby muscles.

The occurrence of a severe attack of pain, nausea, vomiting and collapse, associated with floating kidney is known as *Dietl's crisis* and is thought to be due to twisting, kinking or strangulation of the ureter. Morphia is necessary for the relief of pain, and repeated attacks indicate operative measures to insure permanent support.

Benign Tumors of the Kidney and Ureter

These include *lipomata, angiomata, adenomata* and *papillomata.*

These are seldom of grave importance unless they grow to large size or cause bleeding. Then the treatment is surgical.

Calculi of the Genito-Urinary Tract

Prophylactic measures against the formation of calculi in the urinary tract are limited in their efficiency. This much may be said: If a person has had a stone or stones of known composition, diet may be regulated and medication administered to prevent the excess of phosphates, urates, or oxalates in the urine. The limitation of this is apparent when it is realized that a stone can be composed of two or more salts. However, the taking of plenty of water and the leading of an active life will do something toward preventing the formation of stones.

Renal Colic

The treatment of renal colic resolves itself into two indications: relief of pain, and means to favor the downward passage of the stone. In typical renal colic the pain is so intense that its control is of primary importance. Rest is essential and heat should be applied over the seat of pain. Rectal enemata of hot water helps the pain. Morphin and atropin should be given in full doses, and sometimes inhalations of chloroform are necessary.

When the pain is less severe, and the hope is entertained of aiding the progress of the stone, small doses of belladonna may be given, so that peristalsis is not inhibited, and spasms of the musculature are overcome. The secretions of the kidney should be increased by adequate water intake.

Stone in the Kidney

Kidney stones may be in the pelvis, in the calices or in the cortex.

Operative treatment is indicated, especially if it is evident that the stone is fixed or too large to pass down the ureter, or if infection is present.

The procedures are as follows:

Nephrolithotomy or pyelotomy in aseptic cases without drainage.

Nephrotomy for septic cases with drainage.

Nephrectomy when kidney function is impaired or destroyed and the other is functionating sufficiently.

Parasites of the Genito-Urinary Tract

Strongulus gigans (Palisade Worm), Distoma hematobium, and Filaria sanguinis.—These are parasites which may be taken into the system with the drinking water, and are found in the urine of persons who live in a tropical climate. They give rise to lymphatic obstruction and to symptoms of pyelitis. The urine in such cases is milky. This condition is known as *chyluria.*

Filaria is a worm several inches long, which may live for years in the lymphatics. Thymol (1 to 10 grains) several times a day, and methylene blue (2 grains every four hours) have been given internally to destroy the parasite. The clinical symptoms of *Bilharzia hematobia* arise from the burrowing of the eggs in connection with their hatching. The symptoms are *hematuria, pain,* and *tenesmus; granulation tumors* have been known to form in the mucous membrane of the bladder; and eventually renal obstruction and suppuration may supervene. A positive diagnosis is made by finding the ova or embryos in the urine. The treatment by the administration of male fern has not given satisfactory results. Surgical means have been employed in suppurative cases.

Echinococcus.—The cyst of echinococcus may involve the kidneys and the bladder, giving rise to symptoms of pyelitis or cystitis. The hooklets of the parasite may be found in the urine. The *treatment is surgical,* particularly where there is tumor formation. (*See also* Section IV.)

Affections of the Ureters

The ureters are liable to become obstructed by calculi or constricting bands or by the pressure of tumors. They may participate in the ulcerative tuberculous processes of the genito-urinary tract. Torsion and kinking of the ureters sometimes take place in floating kidneys and give rise to *painful crises,* known as *Dietl's crises.* In such cases one-sided pain or colic is usually present. By means of the Harris segregator or catheterism of the ureters we may definitely ascertain which side of the urinary tract is involved. Injury to the ureters is possible in major pelvic and abdominal operations. Prolapse of the inverted lower portion of the right ureter into the bladder and through the urethra, in a child two weeks old, was reported by the writer in the *American Journal of the Medical Sciences* for May, 1888.

Total extirpation of the ureter has been done in connection with extirpation of the kidney for malignant growths or calculous and tuberculous diseases (*See* case of Dr. Willy Meyer in the Jacobi *Festschrift,* 1900).

Stone in the Ureter

The treatment of stone in the ureter depends upon its position and size. The following measures may be employed before operation is resorted to:

(*a*) If a stone is hindered in its downward course at one of the three points of physiological constriction of the ureter, its progress can often be helped by injecting a thin, sterile oil, by means of a ureteral catheter.

(*b*) Strictures may be dilated by graduated bougies, or by means of the D'Arsonval current applied through a suitable electrode.

(*c*) If a stone lodges in the intravesical portion of the ureter it may be grasped with appropriate forceps through an operating cystoscope or an endoscope and removed.

These means failing or being inapplicable, operative removal is required.

Stones in the upper part of the ureter near the pelvis may be removed through a kidney incision. For others, except the lowest, the retroperitoneal route is preferable. Stones in the pelvic portion of the ureter may be removed by suprapubic incision in the male, and by vaginal section in the female.

The dangers from impacted stones should be appreciated. It may completely block the ureter and cause cessation of kidney function or, by partial obstruction, cause impairment of the kidney, or hydronephrosis, with the ever present possibility of infection. Reflex anuria may occur in the other kidney, or indeed simultaneous obstruction may be present in both.

The Bladder

Vesical Calculi

Stones in the bladder may be primary or secondary. If primary they may form around bodies introduced by accident or design. Sutures often form a nucleus. The removal of the foreign body is essential to prevent reformation. Chronic cystitis or anything which causes obstruction and alkaline fermentation favors stone formation. Calculi descending may remain in the bladder and increase in size.

Treatment.—The treatment of calculi in the bladder is removal. No medication will serve to dissolve them.

Operating cystoscopes are constructed which make it possible to remove stones or to crush them and remove the fragments. This is applicable to small stones that are not too hard. Otherwise the choice lies between litholapaxy or operative removal.

The procedure of litholapaxy consists in crushing the stone and evac-

uating the fragments with a specially constructed pump. It is the method of choice, being safer than operation and should be used in all cases where the instrument can be introduced.

Contra-indications (as given by A. C. Cabot in "Keene's Surgery") are as follows:

1. Very large or very hard stones that cannot be crushed.
2. Stones having a foreign body as a nucleus too hard to crush, or too large to be removed through the tube.
3. It may be impossible to grasp the encysted stones.
4. Impacted stones in the prostatic urethra that cannot be pushed back into the bladder.
5. False passage or enlarged prostate may interfere with the introduction of the instrument or increase the dangers of the procedure.

Operative Treatment.—The choice lies between perineal and suprapubic cystotomy. The latter is generally favored, except when the stone is impacted in the prostate. The suprapubic route permits of the removal of the largest stones, and affords opportunity to deal with any complications or to correct causative factors.

Vesical Calculus in Females.—Small stones may be removed through the open endoscope with grasping forceps. Even though the stone is larger than the caliber of the tube, this may be withdrawn over the forceps and the stone dragged out through the urethra, due consideration being taken for the relative size and the roughness of the stone.

Litholapaxy can be employed in the female with greater ease than the male, as there are no obstructions. Otherwise contra-indications are similar to those in the male.

Operative removal may be done by vaginal cystotomy or by the suprapubic route. The former is easier, but is contra-indicated when the stone is too large, when a previous operation on the anterior vaginal wall renders the bladder inaccessible from below.

Vesical Calculus in Children.—In children, both male and female, the suprapubic route is the practical means of removing calculi.

Exstrophy of the Bladder.—Exstrophy of the bladder is an absence of its anterior wall with deficiency in the corresponding abdominal wall. This condition can be remedied by a plastic operation described in special surgical works.

Vesical Diverticula.—Vesical diverticula are sometimes met with.

Injuries.—*Contusions* and *perforating wounds,* resulting in rupture of the bladder, are met with and are of a serious nature when extravasation of urine results. When rupture is suspected, a soft catheter should be introduced into the bladder. If the urine comes away bloody, a measured quantity of boric acid solution should be injected into the bladder. In case of rupture, the full quantity of liquid cannot be regained by catheterism, and immediate surgical treatment may become necessary.

Inversion of the Bladder.—Inversion of the bladder through the female urethra has been observed. In such cases the viscus presents in the form of a bluish pink sac.

Vesical Hypertrophy.—Vesical hypertrophy is seen in cases in which an obstruction to the flow of urine has developed gradually.

Fistulous Opening.—When a fistulous opening between the bowel and bladder exists, foul gas and fecal matter will be expelled with the urine. *Vesicovaginal fistula* may occur from childbirth and from injury and requires surgical repair.

Vesical Neuroses and Irritability of the Bladder.—Vesical neuroses and irritability of the bladder are usually of a reflex nature, depending upon disease of neighboring organs. A marked irritability of the bladder is occasionally observed in cases of appendicitis. Neurotic individuals, adults as well as children, urinate frequently. On the other hand, neurotic retention of urine is not uncommon.

Retention is often observed after childbirth or following operations on the rectum and penis. The inhibitory effort is due to the dread of exciting pain. In such cases the application of a hot water bag is often efficacious. *Nocturnal incontinence* in children is frequently observed.

In some neurotic individuals there may be a local irritation due to the deposit of crystals in the urine. When a cystoscopic examination is made in a case of irritable bladder, a localized hyperemia of the trigonum is often found. In protracted cases of this nature a few applications of a five per cent solution of nitrate of silver directly to the red patches will have a curative effect. Otherwise the treatment is that of the underlying cause.

Paralysis and Atony of the Bladder.—Paralysis and atony of the bladder, with retention or incontinence, are met with in serious lesions of the central nervous system, as in locomotor ataxia and spinal sclerosis. The treatment for such conditions must be directed to the underlying cause, and when syphilis of the nervous centers is suspected, energetic antisyphilitic treatment is indicated. In cases of incurable incontinence a rubber urinal may be worn by the sufferer.

Cystitis

Etiology.—Cystitis is caused by infective agents, most commonly gonococci and tubercle bacilli (which will not be considered here), the colon bacillus, streptococcus and staphylococcus or Bacillus pyocyaneus. However, there must be some antecedent factor that lowers the resistance, such as trauma from catheterization or instrumentation, congestion from exposure, pressure from tumors from without, or from growths or foreign bodies within the bladder, displacement of the bladder or anything causing retention or lack of drainage. To successfully treat any case of cystitis it

is necessary to remove the cause as well as to cure the local inflammation. This must be emphasized when the source of the infection is higher up in the urinary tract.

Acute Cystitis.—The indications to be met are relief of pain and frequency of urination and eradication of the inflammation. Rest in bed, as in any active infection, is essential. Sedatives are often necessary, codein or morphia by mouth or hypodermically, or opium and belladonna *suppositories;* hot sitz baths help to relieve the tenesmus.

An abundance of water is necessary to dilute the urine. Urotropin by mouth (gr. v to vii) every three hours seems to render the urine in a measure bactericidal.

The bladder should be washed out two or three times a day with warm saline or boric solution and some silver salt introduced—argyrol (10 per cent) is preferable for the acute case. About one ounce can be left in. The diet should be light and free from irritating or stimulating substances. In intractable cases when there is extensive discomfort, it is justifiable to perform a vaginal cystostomy. Bladder irrigation applies to severe cases.

The acute case may clear up entirely or go on to the subacute or chronic stage. Many cases are first seen in the chronic stage. It is essential to eliminate all predisposing or aggravating causes. A thorough cystoscopic examination should be done in order not only to eliminate the kidneys as a source of infection and to rule out the presence of calculi, new-growths, diverticuli, communications with neighboring suppurating organs, but to determine whether the inflammation is general or localized to the trigonum.

If the disease is localized to the trigonum in women, the best results are obtained by applications of silver nitrate (1 to 5 per cent on an applicator) through the open endoscope.

A generalized inflammation is best treated locally by irrigations and instillations. The bladder is first washed with boric or saline solutions to remove pus and débris and to distend the bladder walls. Then the desired solution can be instilled (argyrol 10 per cent solution).

Chronic Cystitis.—For chronic cases, nitrate of silver is on the whole preferable. Beginning with 1 to 10,000, the strength can be increased up to 1 to 100. The practitioner must be prepared to employ other solutions, as these cases are too often stubborn, and various means must be resorted to. The organic silver salts may be used, argyrol (20 per cent) or protargol (2 to 10 per cent). Potassium permanganate (1 to 10,000) or bichlorid of mercury at about the same strength. In infections with the colon bacillus especially, instillations of formalin will be found efficacious when other means fail. The strength should be 1 to 10,000 at first, and this can be increased gradually to 1 to 3,000. Instillations should be given at least three times a week, with daily irrigations of boric or saline solutions.

In regard to internal medication, continuous use of urotropin (gr. v to vii), three to four times a day is salutary.

To control pain and tenesmus opiates may be employed. The use of hyoscyamus in combination with an alkali is beneficial, as:

℞ Pot. acetatis .....
Pot. bicarbonatis ..... āā gr. v 0,3
Pot. citratis.....
Tinct. hyoscyami.....mn. x 0,6
Aq. dest.....q. s. ad ℥i 4,0
One dram to be given every 3 or 4 hours.

Suppositories in Cystitis.—

℞ Extr. opii.....gr. ½ 0,03
Extr. belladon.....gr. ½ 0,03
Butyr. cacao.....gr. x 0,6
M. S.: Insert into rectum twice a day.

It is essential to determine the infecting organism and if possible have an autogenous vaccine prepared and administered. This addition to the treatment is especially beneficial in infections by the colon bacillus.

Ulcerative Cystitis

Ulceration in the bladder may be due to traumatism, thrombosis of veins, pus infection, syphilis, tuberculosis, or carcinosis. *Hematuria* is generally observed in such cases.

Treatment.—The treatment is *radical* or *palliative,* as outlined under chronic cystitis. In catarrhal cystitis with superficial simple ulceration, in which palliative treatment is of no avail, local cauterization may be indicated. Tuberculous ulceration may require direct local treatment in cases in which bladder irrigation with boric acid solution or with iodoform emulsion fails to give relief.

The radical treatment is directed to the *primary cause,* and is elsewhere discussed. The palliative treatment consists of rest in bed, opium and belladonna suppositories, subcutaneous injections of morphin, and the free administration of warm drinks (flaxseed tea or peppermint tea). If the symptoms are urgent, it may be well to irrigate the bladder by means of a fountain syringe and a soft rubber tube once or twice a day with some mild antiseptic solution, such as boric acid solution (2 per cent) or formalin solution (5 to 10 minims to a pint). In chronic cystitis vesical drainage and direct local treatment in conjunction with hygienic measures may be called for. Drainage may be effected through a perineal incision, a suprapubic incision, or, in the female, through the vaginal fornix.

New-growths (*Benign*)

The commonest new-growth in the bladder is *papilloma.* Others are *myxoma, fibroma* and *myoma.* The two latter are rare.

The benign tumors are most easily and effectively removed by applying the Oudin current through an operating or catheterizing cystoscope. If pedunculated, the current can be applied to the pedicle. If sessile, the current can be applied over the presenting surface. Several applications of the current must be made, and after the tumor has disappeared the patient's bladder must be explored with the cystoscope at intervals to note any recurrence.

In women the sparking can be done through an open endoscopic tube; in fact, pedunculated growths may be removed through the tube with a snare.

The tendency of papillomata to undergo malignant changes must be borne in mind.

Tuberculous, syphilitic and cancerous lesions of the urinary tract are discussed in Section V.

Ailments of the Male Genito-Urinary Tract

For tuberculous, syphilitic and malignant ailments *see* Section V.

Catheterization in the Male

Aseptic precautions should be rigidly observed in catheterization of the male. For ordinary indications a soft rubber catheter should be se-

FIG. 134.—INTRODUCING FILIFORM BOUGIE AND GROOVED SOUND. (After Morrow, "Diagnostic and Therapeutic Technic," published by W. B. Saunders Co., Philadelphia.)

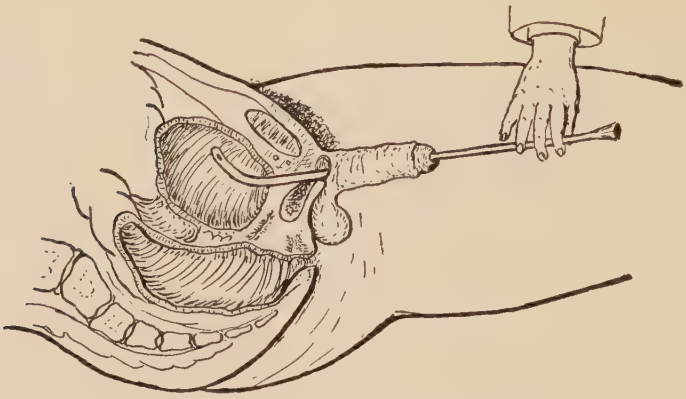


FIG. 135.—CATHETERIZATION. (After Hoxie, "Symptomatic and Regional Therapeutics.")

lected and sterilized by boiling. The hands should be sterilized and the glans penis cleansed with cotton soaked in boric acid solution. The catheter should be lubricated with sterile olive oil or glycerin or other suitable lubricant. The catheter should be introduced slowly, and without force; if difficulty is encountered the catheter may be at fault. More often spasm of the constrictor muscle will prevent entrance. A little patience may be necessary, and the patient must be encouraged to relax.

FIG. 136.—CATHETERIZATION. (After Morrow, "Diagnostic and Therapeutic Technic," published by W. B. Saunders Co., Philadelphia.)

If it is impossible to pass the soft rubber catheter, means will have to be resorted to as described under Retention.

Retention of Urine

The treatment of this condition depends somewhat upon whether it is due to some organic lesion of the urinary tract, or to some more simple cause, as spasm of the compressor muscle from reflex irritation, or following operations on the genitalia or rectum. In general, however, the simplest remedies should be tried first. Hot saline injections by rectum, turpentine stupes over the bladder, hot sitz-baths and morphia hypoder-

matically may produce the desired result. If these fail, catheterization should be resorted to, either with a soft rubber catheter or, if necessary, with one made of woven silk or other suitable material. If it is impossible by these means to draw urine, suprapubic aspiration is necessary.

When the retention is due to an old stricture and relaxation has failed

Fig. 137.—Method of Lubricating Catheter (Schwalbe).

by simple means, several filiform bougies should be passed until one enters the bladder. A tunneled sound may then be passed over the bougie and the stricture dilated. Occasionally the bougie, if tied in the urethra and left in place some hours, will give sufficient dilatation to cause the urine to dribble out around it.

In cases of retention due to prostatic obstruction, catheterization should

Fig. 138.—Method of Lubricating Catheter (Schwalbe).

be attempted either with a soft rubber catheter, or with a woven Condé catheter. Failing with these, a silver instrument constructed with a prostatic curve should be tried.

If all these means are unsuccessful, suprapubic aspiration should be done. Care should be taken in all cases of retention not to withdraw all of the urine. If this should be done by any chance, two ounces or so of boric solution should be injected into the bladder immediately.

Gonorrheal Infection in the Male

Prophylaxis.—This subject will be considered from the time when exposure to infection has occurred. If a condom is worn infection is hardly possible.

If intercourse is practiced with the bladder not empty, auto-irrigation can be performed after the act. The force of the stream can be magnified by alternately compressing the urethra and releasing the pressure. This method is not without efficacy. Its danger lies in placing too great a reliance upon it.

In the army good results have been obtained apparently by prophylactic packages. Failures seem to lie more in its faulty or tardy use and in the failure of the soldiers to realize the importance of prophylaxis than in the want of efficacy of the means.

One method is to wash the external genitals with bichlorid of mercury solution (1 to 5,000). This is to be followed by the injection of 4 cubic centimeters of 20 per cent argyrol into the urethra with a hand syringe. Two grams of 30 per cent calomel ointment should then be smeared over the penis.

Another package contains a tube of calomel ointment (30 per cent) and phenol (3 per cent) in lanolin. This can be injected into the urethra and smeared over the penis.

Treatment.—It is difficult to outline the best treatment for gonorrhea in the male. There is a wide variety of methods and procedures to choose from, as well as a number of remedial agents. In itself this is proof that there is no specific treatment. Men of wide experience will use very different methods and each one will be justified by his results.

It is proposed that a conservative method of treatment for gonorrheal urethritis and its complications will be outlined.

Dr. F. Cabot, of New York, gives the following printed **instructions to those having gonorrhea, or "clap":**

Gonorrhea, or "clap," is a local contagious disease. To avoid infecting others and to prevent complications, a bubo, stricture, swollen testicles, etc., the following rules should be observed:

1. During the first few weeks walking should be limited. When the discharge is profuse you should keep off your feet as much as possible.
2. Do not use alcohol in any form, as it always prolongs the disease. Drink milk, tea, vichy, or seltzer, and from six to eight glasses of water during the day.
3. Avoid all sexual relations until you have been pronounced cured by your physician, as the disease may be given to a woman even after the discharge has apparently ceased. When it is present you should avoid sexual excitement, as erections always aggravate the disease.
4. Always wash the hands after handling the parts. The discharge, if carried to the eyes, may cause blindness.

5. Sleep alone, and be sure that no one uses any of your toilet articles, particularly towels and wash cloths.

6. Never lend your syringe to any one, and as soon as you are well destroy it.

7. Be sure that the bowels move every day. If they are inclined to be constipated, take a dose of Rochelle salts before breakfast.

8. Do not use mustard, pepper, horseradish or stimulating sauces on your food.

Acute Anterior Urethritis

Prophylaxis and Treatment.—Rest hastens recovery in very acute inflammations, and this dictum applies no less to gonorrheal infections. Rest in bed is difficult to enforce, however, for obvious reasons, so inactivity must be enforced in a measure compatible with the duties and temperament of the patient.

The diet should be simple, non-irritating and non-constipating. Tea, coffee, and alcohol are forbidden, also condiments and spices. Water should be taken freely—eight glasses a day. It seems to dilute the urine and insures frequent auto-irrigation of the inflamed urethra. If this irrigating fluid can be made antiseptic, so much the better. Therefore urotropin (gr. v) should be given every three or four hours. If the urine is acid and irritating, oleum santali (mn. x) in conjunction with the alkalis can be given. *Santyl* is a non-irritating preparation of sandalwood oil free from unpleasant taste. The dose is 25 to 50 drops three times daily or two capsules four times daily after meals.

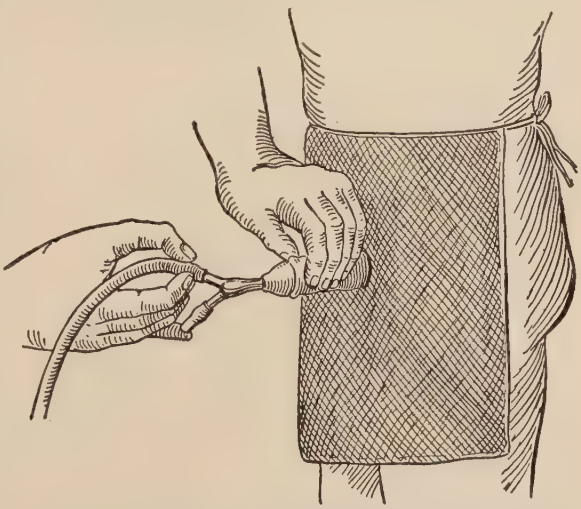


Fig. 139.—Irrigation of Penis (Urethra). (After Morrow, "Diagnostic and Therapeutic Technic," published by W. B. Saunders Co., Philadelphia.)

If there is pain on urination, mn. x-xv of the tincture of hyoscyamus can be added.

Intercourse must be absolutely prohibited. Influences that might cause sexual excitement should be eliminated from the patient's life. He should be acquainted with the seriousness of his infection—it is dangerous to himself and others. He must appreciate the necessity of personal cleanliness and be taught how to avoid re-infection of himself and infection of others by carelessness in the use of toilet articles and the disposal of linen and soiled dressings.

A protective dressing should be kept against the meatus and held in place by drawing over it the foreskin, or in the absence of this, by means of a suspensory bandage. The dressing should be renewed after every urination.

Local treatment during the acute stage is not advised.

When the discharge and local signs of inflammation denote that the process is in the subacute stage, topical treatment should be started.

There are a variety of drugs to choose from and several methods of exhibiting them.

In general, when the gonococcus is present in the discharge, the best results can be obtained from the use of silver salts. After all the nitrate of silver is probably the most efficient. But if it is often found to be too irritating, a recourse may be had to the organic salts as *argyrol* and *protargol*.

As the inflammation is situated in the anterior urethra, the treatment should be confined to that region. Hand injections of argyrol (15 to 20 per cent) can be administered by the patient himself, two or three times a day. He should report every other day, if possible, so that the reaction and character of the discharge can be noted.

By this method the chance of the infection being driven back to the posterior urethra is reduced to a minimum.

The general treatment, as outlined under acute urethritis, should be maintained.

Acute Posterior Urethritis

By posterior urethritis is meant an inflammation which has passed beyond the anterior layers of the triangular ligament and is confined between that point and the bladder; in general, probably 85 to 90 per cent of cases become so involved.

Treatment.—The treatment as a rule should be conservative. The patient should rest as much as possible and injections should be stopped. The diet must be restricted and, preferably, should be of milk. Urinary sedatives are necessary—as tincture of hyoscyamus or belladonna, combined with the alkalis.

For the relief of pain, hot sitz-baths, hot rectal irrigations, and, if necessary, opium suppositories are recommended.

On the other hand, as the process is an extension from the anterior urethra, many authorities deem it reasonable to limit this extension by continuing the hand injections in conjunction with the above treatment. If the symptoms do not subside, with treatment, a soft rubber return flow catheter may be introduced (No. 10 to 12, French) into the anterior urethra and six to eight ounces of warm boric solution injected slowly, once a day. This often gives great relief.

Complications.—The complications of acute posterior urethritis are

most important and constitute the majority of complications seen in this disease. The most common, in the order of frequency, are as follows:

Epididymitis.—This condition is fairly frequent and occasionally involves the *testicle* as well. Here again treatment differs. Many men immediately stop all topical treatment of the urethra, while others equally proficient continue it on the basis that by maintaining the germicidal action of the silver salts on the urethral mucosa the process is more quickly stopped. This seems the more reasonable view. The patient should be placed in bed immediately. The bowels should be freely opened and the diet should be liquid until the acute symptoms have subsided.

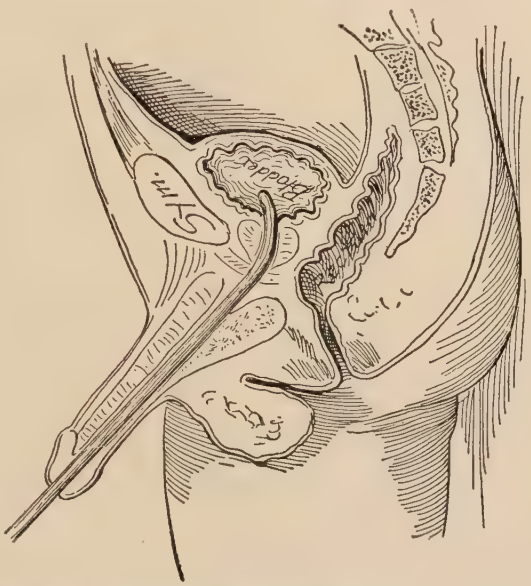


Fig. 140.—Irrigating Posterior Urethra. (After Morrow, "Diagnostic and Therapeutic Technic," published by W. B. Saunders Co., Philadelphia.)

In regard to local treatment various applications may be used. Wet dressings of alum-acetate or lead and opium or a 10 per cent ichthyol ointment are all efficacious. The scrotum should always be supported, preferably by a wide strip of adherent plaster running over the thighs, forming a bridge. When the patient is able to get out of bed a suspensory bandage should be worn.

Prostatitis (Acute).—This is a fairly common complication and may have serious results. As the symptoms are those of a very acute infection, the patient should be immediately put to bed, the bowels opened and a fluid diet ordered.

Local treatment of the urethra may be continued or discontinued, according to the discretion of the practitioner, as in the treatment of epididymitis.

The best form of local treatment consists in hot rectal irrigations, which may be given with a return flow tube or with an ordinary one, which is introduced just beyond the prostate gland. Several pints of saline should be allowed to flow in and out at each irrigation. They may be given every three to four hours. Hot sitz-baths are advisable two or three times a day, while a hot water bag and opium suppository contribute to the relief of pain.

Occasionally acute prostatitis will go on to suppuration, in which instance immediate surgical interference is necessary.

A number of these cases develop into a chronic inflammatory process, the treatment of which will be taken up with that of chronic urethritis.

Seminal Vesiculitis.—The treatment of this condition is practically the same as that of prostatitis, although more difficult to recognize.

Suppuration of the seminal vesicles must not be overlooked, as it demands immediate surgical attention.

Chronic Urethritis.—A very large proportion of the cases of acute urethritis become chronic, either through poor treatment, or inattention to treatment, or to the virulence of the organism, or because of the poor condition of the patient. In addition to this a great number of cases of chronic urethritis are cases which have been supposedly cured and which through excessive sexual indulgence, alcoholic excess or depleted physical condition have recurred. These cases may recur even after a lapse of eight or ten years.

A small percentage of these cases involves only the anterior urethra, while the great majority involves both the anterior and posterior divisions. The treatment in these conditions is practically the same, the difference being that the medication is introduced less deeply in the former than in the latter.

Chronic Anterior Urethritis.—The most satisfactory treatment is as follows: The patient, having urinated, is placed in a sitting posture on the table, and No. 10 to 14 French catheter (sterile) is introduced as far as the triangular ligament. A four ounce syringe is applied to the end of the catheter and eight to ten ounces of the following solution, which has previously been warmed, is slowly introduced and allowed to run out about the catheter into a basin.

℞	Zinc sulfo carbolat	ʒi	4,0
	Aquae	ʒviii	240,0

Ft. solut.

This solution may be gradually strengthened or a solution of alum of the same strength may be substituted. These irrigations should be repeated every two to five days, depending on the response to treatment.

If after two weeks of the above, the symptoms do not seem to have improved, it is wise to resort to stronger solutions. Potassium permanganate or silver nitrate are perhaps the best drugs to employ. If the former is used, one should start with a solution of 1 to 8,000, or 1 to 10,000 and gradually increase the strength to 1 to 1,000. Silver nitrate should be started at 1 to 20,000 and worked up to 1 to 5,000.

In all of the above injections the patient should be carefully observed for any signs of irritations from the medication employed and, at the

appearance of such symptoms, the strength should be immediately reduced or treatment even temporarily discontinued.

If in spite of the above attention chronic symptoms still persist, instillations of strong solution of silver nitrate may be employed. These are given in much the same manner as irrigations, with the exception that a small one to two ounce syringe is used and very few drops of the solution injected. A No. 10 to 14 French catheter is introduced as above, and a few drops of silver nitrate (1 to 1,000) are introduced. The catheter is slowly withdrawn and a few drops are thus placed along the entire course of the anterior urethra.

Chronic Posterior Urethritis

If irrigations fail to be of benefit instillation and treatment through the endoscope may be resorted to.

In regard to instillations, much is gained by the use of an instrument such as *Bang's syringe sound.* This is a hollow tube, with an opening at either end, and with considerably more curve than an ordinary sound. A small glass syringe accurately fits the end in the operator's hand, by means of which the silver nitrate solution is injected as the instrument is slowly withdrawn. The advantage of this method is that the crypts in the mucosa are flattened by the metal and the solution has a better opportunity to act.

Even when all the above means have been employed in some cases, mucous shreds persist in the urine, and there may even be a slight gluing of the meatus. In such cases treatment through the endoscope is indicated. The persistence of symptoms is due usually to one of three lesions, namely, chronic prostatitis, chronic seminal vesiculitis, or to an ulcerated condition of the urethra. The two former conditions can be found by rectal examination and the latter by the endoscope.

In treating by means of the endoscope, after its introduction all surplus moisture must first be absorbed from the urethra by means of cotton on applicators until a clear view of the mucous membrane is obtained. The tube is then slowly withdrawn and ulcerated spots touched with the applicator, moistened in silver nitrate. A solution of 1 to 5 per cent may be employed.

Gonorrheal Rheumatism

This is undoubtedly the most stubborn complication of gonorrheal infection and not infrequently leaves the patient with a stiff joint.

In the acute stages the patient should be kept at rest and the joint immobilized with splints. Either cold or hot applications may be employed, seemingly with equally efficacious results. Wet dressings of alum-acetate or bichlorid may be used, or ichthyol ointment (15 to 20 per cent). During the chronic stage, massage, baking, electricity, passive motion and the cautery are all helpful.

Perhaps the best results in the treatment of this condition have been derived from the use of gonococcus vaccines. Probably 50 to 70 per cent of cases are benefited by this means, and the joint lesions seem to be the complication of gonorrheal infection which is most influenced by this method of treatment.

Internal treatment seems to be of little value, although the anti-rheumatics, such as the salicylates or potassium iodid may be tried.

Occasionally the joints go on to suppuration, in which case surgical intervention is necessary.

Urethritis (Non-gonorrheal) in the Male

Etiology.—Inflammations of the urethra may have their origin in causes other than the gonococcus.

Intercourse with an uncleanly woman may give an opportunity for such organisms as the streptococcus, staphylococcus, pneumococcus, or colon bacillus to enter the male urethra and set up an inflammation. The soil would be more favorable in a urethra damaged by previous gonorrheal infection.

Treatment.—Irrigation of silver nitrate (1 to 1,000) should be used until the discharge clears up.

In urethritis from toxins, as cantharides, arsenic, etc., or from foods, the remedy is to stop the source of irritation.

A traumatic urethritis may be the result of frequent catheterization. Venereal excess will cause a discharge. Such conditions will clear up with attention to the causes and measures to eliminate them.

Chronic Prostatitis

Chronic prostatitis is the extension of posterior urethritis to the prostate gland. The chronic hypertrophy so common in old men is not considered here.

The treatment is practically the same as that of the causative condition, with the addition of prostatic massage. This should be done for two to five minutes. It serves to empty the crypts and ducts of the gland, the discharge from which is being passed through the urethra.

Chronic Seminal Vesiculitis

The treatment of this lesion is practically the same as that of chronic prostatitis. In some rare cases when the symptoms have been of very long standing and are apparently due to vesicular inflammation, surgical intervention has been tried with very good results.

Stricture of the Urethra

The treatment of this condition depends upon the location of the lesion.

Strictures in the region of the meatus are not amenable to dilatation, and if giving rise to symptoms should be cut.

A large majority of the strictures beyond this point may be gradually dilated by means of filiform bougies, olivary bougies or metal sounds, depending upon the size of the stricture.

The method is as follows: If it is not possible to pass a small metal sound or olivary bougies, filiform bougies should be used until a sound can be introduced. The greatest care should be used to prevent the creation of a false passage. The sounds should be increased in size at each sitting, starting with a No. 12 to 15 French and continuing until the urethra admits a No. 28 to 30 without difficulty.

During the period of dilatation, instrumentation should be employed every five days; after this time the intervals should be gradually lengthened, until a sound passed two or three times a year will be sufficient to insure permanent relief.

After each instrumentation it is well to give the patient some urinary antiseptic and sedative. Urotropin and sodium benzoate make a good combination.

A number of strictures, however, because of their density and impermeability will not yield to dilatation. Such cases should be treated surgically, either by internal or external urethrotomy, depending upon the location of the lesion.

Stenosis of the Urethral Orifice

Stenosis of the urethral orifice is readily enlarged by cutting under cocain.

Urethral Caruncles

Urethral caruncles at the orifice sometimes give rise to reflex symptoms which disappear when the excrescences are cauterized or cut away.

Papillomata and Polyps of the Urethra

Papillomata and polyps of the urethra give rise to reflex symptoms and discharges. They may be located by means of Klotz's urethroscope and cauterized or removed by the snare or knife.

Urethral Calculus

A small stone may become impacted in any part of the urethra and give rise to pain or also to retention of urine when the stone is large enough to obstruct the urinary canal. It must be removed.

Peri-urethral Abscess

Peri-urethral abscesses are occasionally met with. They give rise to local disturbance and the so called urethral chill, and require the knife.

Chancroid—Soft Chancre

(*Ulcus Molle*)

Soft chancroid is a localized infection, ulcerative in character, caused by the Bacillus of Ducrey. The lesions are apt to be multiple.

The severe form is the phagedenic ulcer, which may end in sloughing and gangrene of the affected part. Chancroid may be situated anywhere on the prepuce or glans, or within the anterior urethra. The ulcer is soft to the touch, but from frequent irritation and cauterization it may become hard and indurated, simulating the primary lesion or induration of syphilis. In urethral chancroid a sanguineous discharge appears at the orifice, and on taking the penis between the fingers a circumscribed indurated and tender spot can be felt. Chancroid is a local affection. To distinguish between a *simple* and *chancroidal excoriation* is often difficult and occasionally impossible. A *syphilitic* chancre has a cartilaginous hardness and is followed by chronic induration of the inguinal glands (bubo). Glandular induration from chancroid frequently ends in suppuration (bubo).

The phagedenic and sloughing chancre cannot be mistaken for the syphilitic variety.

Prognosis.—The prognosis is favorable, and it takes from one to six weeks to effect a cure.

Prophylaxis.—Prophylaxis is secured by personal purity or the wearing of a condom.

Treatment.—The affected parts should be washed with mercuric bichlorid solution (1 to 1,000), after which the penis can be wrapped in gauze saturated with aluminum acetate solution, which should be kept wet. If the patient has to be about attending to his various duties, and a wet dressing is not practical, a dressing powder such as calomel and bismuth (equal parts), or aristol, may be used. Chancroids of the urethra and meatus necessitate irrigation with potassium permanganate solution (1 to 5,000) by means of a rubber recurrent catheter. When cauterization is demanded nitric acid or the actual cautery are employed after cocainization. Should chancrous pus discharge from under a tightened prepuce, the latter must be slit open and all tension removed and the ulcer treated in the usual way. When local inflammation and swelling are pronounced, ice cold lead water should be applied to the parts.

A penis with a sloughing chancre should be bathed every two hours in warm water containing liquor sodae chlorinat, 1 to 20. The promptest

means of arresting sloughing and hemorrhage is the actual cautery with an occasional incision to relieve tension. The patient should have fresh air, a generous diet, and open bowels, and 5 drops of dilute hydrochloric acid in water should be taken after eating, to aid digestion. Alcohol in some form may occasionally be useful for its stimulating properties.

A *bubo* requires an ice bag or hot-water bag, and should suppuration set in free incision or extirpation.

Chancroids of the lip, tongue, and other parts are treated in the same way.

Prostatic Hypertrophy

Etiology.—Apparently there is no definite cause known for the enlargement of the prostate gland that occurs so often in elderly men. Alco-

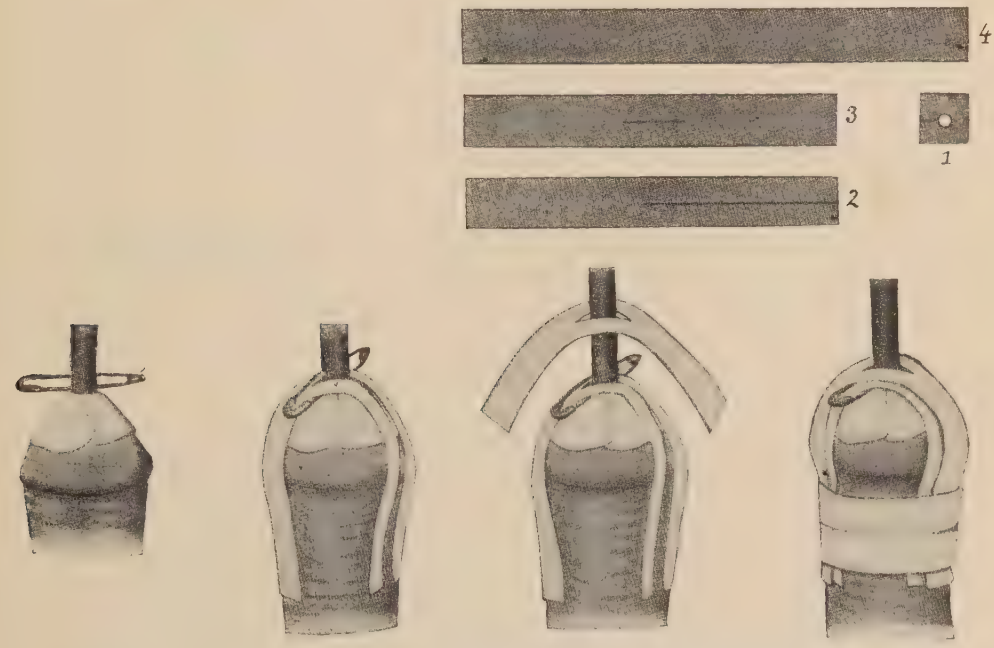


Fig. 141.—Mode of Keeping Catheter in Situ (Schwalbe).

holism and sexual excess are thought to be causative factors. Possibly the hypertrophy may be the end result of a chronic gonorrheal infection. Whatever the cause may be, it is known that alcoholic or sexual excess—in fact even the slightest deviation from simple and careful living—will aggravate the symptoms produced by a prostate already enlarged.

The significance of an enlarged prostate depends upon the interference with urination and the consequent effect on the urinary organs and the health of the patient.

Treatment.—The treatment is palliative or operative.

Palliative treatment consists, first, of attention to simple rules of living. Anything causing congestion of the lower genito-urinary tract should be avoided.

In the earlier stages catheterization may not be necessary except at long intervals, when retention occurs from congestion that is transient, creating a temporary inability to urinate.

As the obstruction increases, the ability to empty the bladder becomes correspondingly more difficult, and the amount of residual urine greater. The bladder must then be emptied regularly; the greater the amount of residual urine the oftener must it be done. The patient should be taught how to catheterize himself, and should appreciate the necessity of rigid asepsis. A soft rubber catheter is best (size 12 to 18 French). If this is not adequate, a woven catheter can be used.

If a cystitis is present it must be treated. When retention occurs and the bladder cannot be entered by ordinary means, the procedure outlined under Retention, in this section, should be followed.

In early cases cures have been reported by sparking the enlarged prostate with the high frequency current. The unipolar or D'Arsonval current is used and is applied through an operating cystoscope.

Operative procedure often has to be resorted to. Many patients are not good operative risks on account of advanced age. In general it may be said that an operation early is no more dangerous than catheter life, with the risk of cystitis and ascending infection to the kidneys.

Operation is indicated when obstruction is so complete that aspiration to empty the bladder has to be repeated.

Hydrocele

Hydrocele is a collection of fluids in the tunica vaginalis. It may be caused by trauma or it may be the expression of an inflammatory process, as gonorrhea, syphilis, or tuberculosis of the epididymis or testicle or by a new-growth.

Some cases can be cured by aspirating the fluid and injecting one-half per cent chlorid of zinc solution into the sac, but operative treatment is often necessary and is recommended.

Phimosis

Phimosis is a condition in which the prepuce covers the glans penis, retraction being impossible or difficult because of adhesions or because the preputial orifice is too small. Circumcision is advisable.

Many cases, however, would not require circumcision, if shortly after birth (about the fifth day) the foreskin had been retracted. Difficulty is seldom encountered at this time, and adhesions will not take place if retraction and cleansing are made a part of the child's daily toilet.

Phimosis may be associated with acute inflammatory processes such as gonorrhea. In such cases a dorsal slit may be made as a palliative measure and wet dressings applied until the inflammation subsides.

Elongated Prepuce

An elongated prepuce gives rise to various annoying symptoms which disappear after the prepuce is amputated.

Paraphimosis

When a tight foreskin slips back around the corona of the glans and cannot be easily reduced, the condition is known as paraphimosis. Strangulation may result if it is neglected.

To replace the foreskin it is necessary to press out the blood from the glans, which becomes turgid from the constriction.

If reduction is impossible by manipulation, the constricting band must be divided on the dorsal surface.

Balanitis

Inflammation of the glans penis may be caused by lack of cleanliness, purulent discharges from the urethral canal, specific ulcers, and the like. By attention to the cause, cleanliness, and the use of antiseptic dusting powders the inflammation may generally be made to subside within a short time.

Herpes preputialis

Herpes preputialis is a vesicular eruption of the penis which may terminate as a simple ulcer, and which is apt to be mistaken for the initial lesion of syphilis. It generally disappears rapidly under treatment with sedative lotions or dusting powders.

Chordee

Chordee is a painful erection with curvature from various transitory causes. Cold compresses and the administration of bromural (gr. x) will overcome the difficulty.

Priapism

Priapism is a continued and generally painful state of erection of the penis, sexual excitement and desire being absent.

It may occur from local injury or disease or follow operations. Irritation from phimosis or the presence of calculi may cause it. In some cases no assignable cause can be found.

The treatment consists of the removal of the cause, if possible. The patient should be advised to rest with cold moist dressing to the penis.

Sedatives may be given, as sodium, bromid, chloral, morphin, and belladonna, and a purge administered.

Extravasation of blood may occur, necessitating incisions.

Benign Tumors of the Penis

Benign tumors, such as cysts, fibromas, etc., are sometimes observed on the glans and prepuce. The treatment is the same as for tumors affecting other portions of the body.

Varicocele

Varicocele, or a dilated and varicose condition of the spermatic veins, is more common on the left side. The etiology of this condition is not quite clear. It is generally observed in people whose occupation involves protracted standing. The diagnosis is readily made by inspection and palpation, the veins presenting a soft, irregular, opaque, knotted, pyriform mass. There may be a sensation of dragging or severe pain.

Treatment.—A suspensory bandage, general tonic treatment, and attention to the bowels are indicated. In severe and protracted cases, radical cure by means of subcutaneous ligature can be accomplished.

Impotence

Impotence in the male is that condition in which the man is unable to perform the sexual act. It may be *complete* or *partial*. Erection may subside at or before intromission, or erection and ejaculation may be finished at the moment of intromission or even before, in consequence of hyperirritability. Sterility in the male is an impossibility of impregnating the female because of some impediment to the flow of testicular secretion.

Impotence and sterility are two different conditions, but as a rule an impotent man is also sterile because he fails to deposit the semen deep enough into the female genital tract—to cause impregnation. Organic impotence due to congenital, anatomical, or acquired anatomical defects and injuries is not within the scope of this article.

In locomotor ataxia we frequently observe complete impotence which cannot be overcome as long as we are unable to overcome spinal sclerosis. Interference with coitus by reason of structural impediments such as hydrocele, scrotal hernia, etc., can readily be overcome by surgical means. Functional and psychic impotence with sound sexual organs may be partial or complete.

Leaving aside the impotence of senility and those cases in which the individual never has had a strong sexual desire, or instances of vaginismus in the female which interferes with the sexual act, we recognize a number of etiological factors which underlie functional impotence in which the

sexual centers are at fault—such as excessive coitus, withdrawal, masturbation, ungratified sexual desire, etc. In some instances there is exhaustion of the erection center and in other cases there is an inhibition frequently due to fear, nervousness, and overanxiety to accomplish the sexual act (psychic form).

Treatment.—Well directed treatment of functional and psychic impotence implies a careful inquiry into the underlying causative factors. Where exhaustion of the sexual center is manifest absolute sexual rest is indicated for from three to four months. Local treatment of the diseases of posterior urethra, seminal vesicles and prostate may be required. Abstinence from alcoholic stimulants and eggs is salutary. Bromid of sodium or bromural may be given in fifteen grain (1,0) doses three times a day.

Under this treatment sexual desire may diminish, much to the chagrin of the patient, and for the time being this is as it should be.

For local irritative conditions a cold sound should be passed, and the instillation of 1 to 3,000 argentic nitrate solution may be accomplished through a sound syringe devised by the late Dr. Banks of New York, and repeated if necessary once a week. Massage or expression of the prostate has considerable value in counteracting local congestive conditions. Constipation is readily overcome by one-half a tumbler of laxative water before breakfast. Cold spinal douches and outdoor exercises will tone up the system generally. Eventually several stimulants such as strychnin, phosphorus and johimbin are indicated.

℞ Strychnin nitr..... gr. i 0,06
Acid. phosphor. dil..... ℥i 30,0
Sig.—Take 10 drops 3 times a day.

Johimbin is given in tablet form—one tablet three times a day. In psychic impotence strychnin, electricity and suggestion therapy will straighten out matters.

Neuroses and Neuralgias of the Male Genital Organs

Neuroses and neuralgias of the male generative organs are very common in neurotic individuals. In the absence of some source of local irritation about the anus and genital region, a general tonic treatment is indicated, including outdoor exercise, regulation of the bowels, cold douching, iron, bromids, etc.

Derangements of the Genito-Urinary Organs in the Female. Prophylaxis and Treatment

For syphilitic, tuberculous and malignant ailments *see* Section V.

Catheterization in the Female

Catheterization in the female should rarely be impossible—as it may be in the male.

Catheterization should be done under aseptic precautions, and preferably with a soft rubber catheter which has been boiled. The hands should be thoroughly cleansed and the parts wiped clean with pledgets of cotton wet with boric solution. The fingers should part the labia so that the external meatus is plainly visible and the labia should be kept apart until the catheter is in the bladder. The urine should be allowed to drain off and the catheter then pinched between the fingers and gently removed. The vulva should then again be cleansed with boric solution. Avoidance of injury to the mucous membrane is most important. More harm is done by trauma than by lack of asepsis.

Sometimes difficulty is encountered. Especially in nulliparae, it may be hard to find the meatus, or again in multiparae, where the mucosa is thrown into folds from stretching and laceration of childbirth. But no trouble will be encountered if one starts with the clitoris as a landmark. The external meatus must be directly below, the distance varying with the individual anatomical structure. Tumors pressing on the bladder and the fetal head, when well engaged in the pelvis, may prove obstacles not often insurmountable. Frequently after considerable vaginal packing is introduced, it may be found absolutely impossible to introduce a catheter. The simple expedient of withdrawing the most external portions of the packing will remove the difficulty.

The indications for catheterization are retention from whatever cause—hysterical, postoperative, etc. A patient can go ten to twelve hours after operation without danger, except in gynecological work, where the positions of the uterus or bladder have been changed. In such cases eight hours is a safer limit, as overdistention must be avoided. Catheterization is necessary to obtain sterile specimens of urine for bacteriological examination and to insure lack of contamination with vaginal secretions.

Incontinence in the Adult Female

Aside from causes of incontinence common to both sexes, such as spinal cord lesions, injuries at childbirth are the most important cause of this affection in females. The injury may be an actual tear or rupture of the

muscle fibers or merely a loss of tone from prolonged pressure. The prophylaxis of such conditions is the practice of good obstetrics.

Incontinence is seen in women independent of childbirth, sometimes in young nulliparae or in women advanced in life, burdened with a pendulous abdomen.

Kelly reports success from operation in the above described cases. The procedure is, in short, exposure of the neck of the bladder and of the urethra by vaginal section and suturing the torn or relaxed muscle fibers.

An overflow incontinence is sometimes seen in women with cystocele. The treatment is surgical correction.

A certain number of cases of incontinence must be ascribed to functional nervous conditions, such as hysteria or neurasthenia. The treatment must be directed to the establishment of normal, mental and psychic equilibrium.

Menstrual Disorders

Menorrhagia and Metrorrhagia

Menorrhagia is prolonged or excessive menstrual flow.

Metrorrhagia is bleeding from the genital tract between or independent of menstrual periods.

These two symptoms of menstrual disorders, for the most part, can be discussed together, except for a few preliminary remarks in regard to menorrhagia. There is only one standard by which to judge whether a woman has menorrhagia—that is, whether she is losing more blood than she can spare. What would be a normal flow for one woman may be excessive for another. Therefore a menstrual flow cannot be called profuse or excessive unless there is a consequent anemia. One must be sure that there is no other cause for the anemia before it is ascribed to the loss of menstrual blood. However, the causes that operate to produce menorrhagia often progress so as to produce first, bleeding that comes before the normal time and, finally, bleeding that occurs quite independent of the cycle. So the prophylaxis and treatment of the two conditions will be considered together.

Causes of Bleeding.—The most important causes of pathological bleeding that are preventable are retained secundines and subinvolution of the uterus after abortion or childbirth. Careful inspection of the placenta and membranes after expulsion and proper steps taken to empty the uterus, if they are incomplete, will prevent serious loss of blood. A subinvoluted uterus is not able to resist the periodic congestion; the flabby, weak musculature cannot contract on the bleeding vessels. Rational obstetrics then will prevent the occurrence of a large number of cases of pathological bleeding.

As a general thing, a careful history and examination of a patient who has pathological bleeding will reveal a tangible cause for the condition. To mention some of the causes of bleeding will suggest the treatment.

Causes Connected with Pregnancy Are:—Abortion, accidental hemorrhage, placenta previa, subinvolution, retained secundines, chorion-epithelioma, hydatidiform mole, ectopic gestation.

Causes from Inflammations.—Endometritis, myometritis, pelvic inflammatory disease in general, such as salpingitis, salpingo-oöphoritis.

Causes from Tumors.—Fibromyomata, polypi, carcinoma, sarcoma.

Prophylaxis and Treatment.—Each patient should receive the proper treatment. It is often necessary to treat the uterine bleeding as such. To give examples: in the pelvic inflammatory disease, when conservative treatment is indicated, it may be necessary to control the loss of blood; also in bleeding fibroids near the menopause when perhaps operation is not indicated; or in the floodings that occur around the menopause or in the excessive flow of young girls.

Rest of course is of primary importance. Ergot and hydrastis are well known; they are especially indicated when the uterine musculature is atonic. There are good preparations of ergot that can be administered hypodermically. It is suggested that to get the best results the preparation must be fresh.

℞ Extr. ergot. fl. .....
Extr. gossypii. fl. ..... } āā ℥i 30,0
Sig.—Take 20 drops 3 times a day.

Stypticin can be given three or four times daily in doses of 1 to 4 grains. In this connection, it must not be forgotten that calcium chlorid and calcium lactate increase the coagulability of the blood.

Pituitrin hypodermically administered is a powerful agent for the control of uterine bleeding. Its action is analogous to ergot, though stronger. An ampule administered two or three times a week gives good results.

The treatment of many cases in which uterine bleeding occurs is surgical, but in borderline cases where the indication is not absolute the above mentioned palliative measures will be found useful.

Uterine bleeding after the menopause is suggestive of malignant degeneration (*see* Chapter on Cancer).

Dysmenorrhea

Dysmenorrhea means menstruation attended with pain. Theoretically, the process of menstruation should be painless. Many women experience inconvenience and some are actually prostrated. It should be borne in mind that different people react differently to the same stimulus, and the

nervous equilibrium of the patient must be determined before the disturbance can be ascribed to a pathological condition.

Dysmenorrhea is divided etiologically into (1) obstructive dysmenorrhea, (2) congestive dysmenorrhea, (3) membranous dysmenorrhea.

Causes.—In other words the pain at menstruation is due to something that interferes with the easy exit of the blood or to something that tends to a plethoric condition in the pelvic organs, or to the presence of something that is difficult for the uterus to expel. This classification is not well defined and one or more causes may be present.

To enumerate some of the causes will in a measure indicate the treatment.

Obstruction to the outflow of blood may be due to malpositions or malformations. Perhaps the commonest cause for dysmenorrhea is the undeveloped, anteflexed uterus, so often associated in married life with sterility. The sharp angle between the cervix and the body of the uterus, with lack of mobility between the two, serves to prevent the easy exit of the blood, which necessitates violent and painful contractions of the uterine musculature. Acute retroflexions will produce the same mechanical difficulties, and in addition will be associated with congestion.

Fibroids and polypi will obstruct the canal; tumors and inflammatory processes will cause malpositions.

Anything that will cause the menstrual congestion to exceed the physiological limit will favor the production of pain. Inflammation anywhere in the pelvic organs and fibroids will cause an increase of blood in the uterus. Displacements will cause a passive congestion, as will diseases producing *myocardial insufficiency.*

Treatment.—The most important consideration in the treatment of dysmenorrhea is the removal of the cause—the correction of displacements, the treatment of inflammations, or the removal of tumors.

The type of case that is of the most importance from a *medical standpoint* is that occurring in girls and young women, with acute anteflexion, the so-called undeveloped uterus—the body small, the cervix long, with rigidity at the point of flexion. Usually relief from periodic pain is gradually obtained as the patient grows older and the organs become better developed. Marital relations tend to ameliorate the condition and after childbirth it is relieved. Often, however, after marriage sterility is complained of as well as dysmenorrhea.

A rational procedure in such cases is as follows: In the first few years of puberty, say to the twentieth year, attempts should be made to relieve the pain at the periods and to favor the development of the genital organs by prescribing a mode of life that will promote the physical development of the patient, even if the intellectual training must for the time be sacrificed. This is very important and girls must be removed from school if necessary.

For the relief of menstrual pain viburnum is mentioned only to offer suggestions as to its administration, as its efficacy is so well known. It should be given in a glass of hot water. Some patients obtain relief by taking a dram every three hours; other patients will be benefited by taking a dram every fifteen minutes for an hour, then repeating the course two to three hours later, the amount of water being reduced to one-half a glass or less.

The coal tar products are often beneficial—aspirin, phenacetin, or antipyrin given at two to three hour intervals. Opium and its derivatives are not given, except during the first menstruation following a gynecological operation, when codein in quarter grain doses may be given, provided the patient is kept in ignorance of the nature of the drug.

The following prescription has been found useful:

℞	Antipyrini	ʒss		2,0
	Sodii bromidi	ʒiv		15,0
	Spr. chloroformi	ʒiiss		10,0
	Tinct. valerianae	℥ii		60,0
	Aq. dest. q. s. ad	ʒiv	ad	120,0

M. S.—ʒi, q. 3 h. in hot water.

Benzyl benzoate in 5 to 10 drop doses, well diluted, may be tried.

A hot-water bag over the lower abdomen will always give some relief and immersion in a hot bath is very effectual.

If a thorough trial given to hygienic and medical measures fails, operative treatment must be considered. In virgins one may wait to the twentieth year and then if there is no relief, it is justifiable to resort to surgery. Two methods are suggested:

(1) Dilatation with the insertion of a stem pessary, to be worn for 10 to 14 days.

(2) The Dudley operation, which straightens the cervical canal.

Membranous Dysmenorrhea

Membranous dysmenorrhea must be mentioned. In this condition the uterine mucosa is expelled as a whole or in part, periodically, and with great pain.

Treatment.—It is a rare condition and is best treated by thorough curettage and attention to general health.

Amenorrhea

Amenorrhea is the absence of menstruation at some period between puberty and the menopause. It may be *primary,* when menstruation has never appeared, or *secondary,* when menstruation has been established but fails to return.

Various Types of Amenorrhea.—Primary amenorrhea exists as a result of anomalous or undeveloped pelvic organs. Sometimes it can be demonstrated that there is an absence of the uterus or ovaries; but more often the organs are undeveloped and there is a postponement of their activities. In such a case attention should be paid to the hygiene of the patient—better food and air, outdoor exercises. There should be less attention to the development of the brain and more to the development of the body.

Hydrotherapy in the form of wet compresses to be worn over night around the abdomen should be given a thorough trial, also various internal gland preparations may be tried in succession (corpus luteum and thyroid preparations).

If the patient presents the periodic symptoms of the menstrual molimen without the appearance of blood, atresia somewhere in the genital tract should be suspected and, if present, should receive the proper surgical treatment.

Secondary amenorrhea during pregnancy and lactation is physiological. However, prolonged nursing may cause a lactation atrophy of the uterus and the resumption of menstruation will be postponed. The indications for treatment are to promote the general health and to stimulate the uterus.

It must not be forgotten that amenorrhea is very often a conservative process. In the presence of chronic wasting diseases, such as tuberculosis, malignant disease, and the anemias, amenorrhea often exists. The *underlying cause* should be treated, not the amenorrhea, as this is a symptom only and no attempts should be made to "bring on the flow." Patients should be made to understand that the periodic loss of blood is not a cleansing of the body, as they are inclined to attribute all manner of symptoms to the lack of menstruation.

The type of amenorrhea which is the most important from the standpoint of its treatment *per se* is that occurring in women who experience a premature menopause. This condition is found in women around thirty years of age and is frequently associated with obesity and with sterility, either primary or secondary. The condition is due probably to cessation of ovarian activity, with consequent atrophy of the uterus.

The indications are then:

(1) To supply the deficient or absent ovarian secretions.

(2) To stimulate the uterus.

(3) To restore normal general health.

Ovarian secretion is supplied by the administration of some form of animal extract—ovarian or corpus luteum. Of one of these extracts a five grain tablet should be administered three times a day. Arsenic and iron may be combined in a capsule, to which a cathartic may be added, such as phenolphthalein or the extract of cascara, to counteract the constipating effect of the iron.

The uterus is stimulated by hot vaginal douches and sitz-baths, by massage of the uterus, and by the galvanic current.

If obesity is present, the diet should be restricted—dry meals with plenty of water between meals, reduction of the intake of starches and sugar. Rules for regular exercise should be laid down and massage recommended.

Tonics, such as iron and arsenic, are indicated, especially if anemia is present.

Mention of another form of amenorrhea should be made. That following the artificial menopause from removal of both ovaries is often attended with distressing symptoms. If the patient is young and in good health, the reaction may not be severe, much less so in fact than the natural menopause. However, the administration of a reliable preparation of ovarian or corpus luteum extract may relieve in a great measure the unpleasant symptoms, or do away with them entirely.

Vicarious Menstruation

This rare but interesting condition is mentioned only to point out the fact that treatment directed to the locality from which the bleeding occurs is seldom necessary.

When the uterus assumes its normal function, the vicarious bleeding ceases. If, however, it persists and is annoying and dangerous to life, removal of the ovaries will, of course, relieve it.

The Menopause and Premature Menopause

The fallacy that the *change of life* is a critical and dangerous time is still a widespread opinion and ranks with teething as an all round etiological factor for various derangements. Nervous and vasomotor disturbances are common enough in the menopause period, but they respond admirably to the suggestion therapy and general hygienic measures. In cases of dire necessity bromids may be offered with a view of subduing the excitability of the quasi patient.

Sterility in the Female

In primary sterility, in which pregnancy has never occurred, the husband is to blame in about one case out of four (faulty semen). The term *secondary sterility* applies to women who have been pregnant once and fail to become pregnant again.

Causes.—Dr. Brothers, of New York, states that in 180 women who were considered responsible for the trouble, the causes of the sterility were classified as follows:

General Conditions:		
Obesity	7	cases
Alcohol and morphin habit	1	
	—	8
Pelvic Peritoneum:		
Pelvic abscess	1	
Pelvic tumor (?)	3	
Pelveoperitonitis	14	
	—	18
Annexa:		
Undeveloped ovaries	6	
Ovarian tumor	9	
Salpingo-oöphoritis	28	
Pyosalpinx	7	
	—	50
Cervix and Uterus:		
Pinhole os	5	
Conical cervix	1	
Stenosed cervical canal	22	
Undeveloped uterus	14	
Retrodisplaced uterus	22	
Anteflexed or anteverted	7	
Prolapsus uteri	2	
Fibroids	5	
Endometritis and endocervicitis	15	
	—	93
Vulva and Vagina:		
Unruptured hymen	1	
Vaginal bands	1	
Vaginismus	3	
Gonorrheal vaginitis	6	
	—	11
Total		180

Treatment.—The prophylactic treatment will suggest itself as the treatment of the different causes is discussed.

In the consideration of sterility, either primary or secondary, it is essential first to determine whether or not the *husband produces live spermatozoa.* The procedure is as follows: The husband performs intercourse with a condom. This is removed and its contents kept warm until the physician can examine the semen—which should be done as soon as possible.

Congenital anomalies must be excluded, as absent or rudimentary

organs and atresia or stenosis in the genital tract. Absence of generative organs naturally precludes pregnancy, but some types of gynetresia can be corrected by surgical means.

Perhaps the commonest type of a congenital malformation causing sterility is the small, undeveloped, anteflexed uterus, so often associated with dysmenorrhea. Pregnancy follows in a good percentage of such cases, if the cervix is dilated under anesthesia and a stem pessary introduced. A pessary is allowed to remain in for ten days or two weeks, and intercourse practiced as soon thereafter as possible. Treatment to develop the uterus as outlined under Dysmenorrhea should also be instituted.

Endocervicitis and endometritis will prevent conception, by reason of the chronic discharge, because the secretion makes an uncongenial medium for the spermatozoa, and because an unhealthy endometrium is an unfavorable embedding place for a fertilized ovum. These conditions should receive the appropriate treatment. The presence of a metrorrhagia can prevent the upward passage of spermatozoa or wash out a fertilized ovum.

Looking to the tubes as a factor in sterility, they are often found to be the offending parts. Tubal inflammation—whether gonorrheal or tuberculous, the result of postpartum or postabortion infection, or as a complication of appendicitis—will leave the tubes in so damaged a condition that they are not patent. Sometimes the damage is so slight that it is difficult to demonstrate it on bimanual examination, yet there is occlusion of the fimbriated ends of the tubes, or they may be twisted or kinked, bound down by peritoneal adhesions. Occasionally pregnancy will occur after a conservative abdominal operation in cases presenting the end results of tubo-ovarian inflammation. Tubes can be freed, new abdominal ostia created, and ovaries exhumed from beds of adhesions. This class of cases is not large, and too much hope cannot be extended to the patient.

In the great majority of cases of sterility, a cause can be found if the search is diligent, even though the cause cannot be remedied, as in hopeless destruction of the tubes or ovaries or in congenital conditions, where the development is rudimentary.

Affections of the Vagina and Vulva

Leukorrhea

Etiology and Treatment.—Leukorrhea is a discharge from the vagina, which may come from any place in the genital tract, or from the lower urinary tract, i. e., the urethra.

The treatment of leukorrhea depends upon finding a cause and treating it. It is essentially a symptom. Often simple douching is prescribed for a vaginal discharge with of course apparent good results. The patient does not notice it because she systematically washes it away.

By enumerating some of the causes, the proper method of treatment will be apparent.

In the first place gonorrheal infections—vulvitis, vaginitis, urethritis, cervicitis, endometritis—may all cause a discharge. The treatment will be found elsewhere. Although every infection of the genital tract will not cause leukorrhea, cure of a discharge present cannot be expected until the inflammation is cleared up. It must be remembered that a hypersecretion may result from any condition producing congestion, active or passive, as well as from inflammation.

There are two conditions producing leukorrhea which can be discussed here without danger of repetition—that is, *leukorrhea of virgins* and of the *senile.*

Leukorrhea of Virgins.—In virgins a chronic state of poor health, such as chlorosis, secondary anemias, and debilitated states from faulty hygiene may result in an excess of secretion. Of course, these causes may operate in others, and must be recognized as distinct from inflammatory or congestive causes, but the indication is improvement of the general health by the administration of iron and arsenic.

If examination of the secretions reveals the presence of bacteria, then antiseptic or astringent douches may be given (alum, tannalbin, sulphocarbolate of zinc).

Senile Vaginitis.—Accompanying the atrophic changes in the genitalia after the menopause there is a thinning of the vaginal mucosa and a susceptibility to irritation and bacterial infection. In this condition there may be a blood-tinged discharge.

The treatment should consist of bathing the vaginal mucosa in pure pyroligneous acid, two to three times a week, and the daily use of an astringent douche, such as:

Alum	ʒi	4,0
Borax	ʒi	30,0
Water	to 2 quarts	2000,0

This is especially necessary if a patient is wearing a pessary, the irritation of which will aggravate the condition.

Leukorrhea in Children.—Leukorrhea in children is treated as in virgins.

Vaginismus

Vaginismus may be defined as "an excessive hyperesthesia of the hymen and vulva outlet, associated with involuntary spasmodic contraction of the vaginal sphincters—severe enough to prevent coitus."

A patient suffering from this complaint should undergo an examination, under anesthesia if necessary. It is important to discover whether

the spasm is purely a nervous phenomenon or due to some lesion or obstruction.

Treatment of Vaginismus.—If a rigid unruptured hymen is present, this can be excised and the muscles stretched manually. A glass plug (Sims) may be introduced and allowed to remain while the patient is recovering from the anesthesia. Then on successive days larger glass plugs may be introduced and worn for an hour or longer, until the vagina will permit the introduction of the largest size without discomfort. At first it may be necessary to anesthetize the vagina with cotton soaked in cocain (one per cent), and at all times the plug should be lubricated.

Sometimes the vagina will have to be incised, but the manual divulsion will generally suffice.

If there is an acute inflammatory process this should receive the proper treatment.

If an irritable *caruncle* is present, it should be removed.

It is the physician's duty to so far gain the confidence of the patient and her husband that he can discover if there may not be ignorance as to the proper performance of intercourse.

In all cases attempts at coitus should be prohibited until cure is effected locally or until the nervous equilibrium of the woman is reëstablished.

Dyspareunia

Dyspareunia is difficult or painful intercourse. Unlike vaginismus, it is usually complained of after marital relations have been established, from acquired causes.

Causes.—Painful intercourse may be due to inflammations of the vagina or vulva. It may be due to shortening or narrowing of the vagina from surgical repair, either primary or secondary.

A frequent cause is an inflammatory condition in the adnexa, or the parametrium.

Very often a prolapsed ovary is accountable.

Treatment.—The treatment consists, then, in the removal of the cause.

In doing plastic work, the surgeon or obstetrician must remember that anatomical conditions should be restored as near the normal as possible.

Nymphomania[1]

Nymphomania is described as a morbid and uncontrollable sexual desire in women.

This condition is divided into three classes:

First Class.—This class includes cases in which the cause can be traced to a local irritation, such as adherent prepuce, pin worms, irritating dis-

[1] Frederick, *Amer. Jour. Obstet.*, 1907, vol. LVI.

charges, eczema of the vulva. The cause should be removed before lasting habits are formed. This class is the most amenable to treatment.

Second Class.—Nymphomania is found in women with a neuropathic taint; there may or may not be perversion of the sexual instinct. It is said that if sexual experience comes early in life, excessive venery is the rule rather than masturbation.

Third Class.—The third class is found in the insane, and they are generally taken care of in state hospitals.

The second class is naturally the hardest with which to deal and presents a sociological problem too complex to discuss here.

Pruritus vulvae

Pruritus vulvae, strictly speaking, is a functional neurosis characterized by intense itching of the vulva. However, there are many causes of irritation of the vulva and the treatment depends upon the discovery and removal of the cause.

Causes.—Some of the most common causes are as follows: abnormalities in the urine, especially diabetic urine, highly acid urine, or urine that has undergone ammoniacal decomposition; discharges from the urethra or discharges from the genital tract; parasites, uncleanly habits, and masturbation may all be causes of pruritus. The condition may be aggravated by poor health or anything causing congestion in the vulva, pregnancy, the pressure of tumors, or pelvic inflammation.

Treatment.—If no cause can be ascertained, the treatment is symptomatic. Indeed symptomatic treatment is often necessary while the cause is being removed.

Many drugs have been employed. Only those that have proved the most efficacious will be mentioned here. Various remedies may have to be employed before one is found that will relieve the condition:

A lotion of carbolic acid (2 per cent).

This must be used with care.

Silver nitrate (1 to 2 per cent).

Lassar's paste with salicylic acid or oil of cade (gr. xv and gr. xxx respectively to the ounce).

Bismuth subnitrate—dram one to the ounce of zinc oxid ointment.

If the skin is broken, the itching can be relieved by applying a salve of white vaselin containing 10 per cent of anesthesin.

The necessity for treating the general condition of the patient must not be lost sight of.

Kraurosis vulvae

This is an atrophic condition of the vulva, the skin and mucosa. It is thought to be the end result of a long continued pruritus, and is usually accompanied with intense itching.

If measures to relieve the itching have failed, excision of the vulva is recommended.

Chancroids

Soft chancre or chancroid is a localized infection, caused by the Bacillus of Ducrey, ulcerative in character. It occurs most often on the external genitalia, more rarely in the vagina and in the cervix. The lesions are apt to be multiple.

Treatment.—The treatment consists in the application of strong antiseptics—pure carbolic followed by an application of alcohol, to protect the unaffected parts; later, applications of tincture of iodin should be made. Between treatments the patient should be instructed to use a dusting powder of calomel and to keep the parts clean.

If the inguinal glands become involved, the inflammation should be aborted if possible by rest and cold applications. If pus forms the treatment is surgical.

Inflammation of the Vulvovaginal Glands

(*Bartholinitis*)

If inflammation of the ducts or glands of Bartholin takes place, it should be treated on general surgical principles. Rest should be enforced and cold applications applied.

If an abscess forms it should be incised, irrigated, and packed. If a chronic abscess or cyst forms the sac should be carefully dissected out—preferably under general anesthesia, and the incision sewed up in layers. To merely incise and drain means almost invariably that the sac will fill up again. Swabbing the interior of an incised sack with tincture of iodin may effect a cure.

Affections of the Cervix

Laceration of the Cervix.—Lacerations of the cervix occur at childbirth from the passage of the fetal parts, from the application of forceps, from manual and instrumental dilatation. After parturition it is better not to attempt cervical repair unless there is bleeding. Old lacerations, as a rule, do not demand treatment of themselves, but repair is generally done in conjunction with other plastic work as the primary indication.

Cervical Erosions.—Cervical erosions are often seen in lacerated cervices. The deep red color contrasted with the pink of the vaginal mucosa means that there has been a replacement of the squamous epithelium of the vagina by cylindrical epithelium of the cervical canal. Erosions are an expression of chronic irritation from inflammation, in which event operation is indicated—as in some cases it is a predisposing cause of carcinoma of the cervix.

Erosions of slight or moderate degree can be cleared up by the application of astringents. Pyroligneous acid (full strength) is the most efficacious remedy, applications being made two to three times a week. The so-called follicular or papillary erosions may require more powerful agents, such as pure carbolic, silver nitrate or 50 per cent zinc chlorid.

Cervix Ulceration.—Cervix ulceration sometimes heals promptly if, in addition to local treatment, iodid of potassium is given internally (syphilis).

Inflammations of the Cervix.—When an acute ascending inflammation of the uterus takes place the cervix as a rule partakes of the process. However, in chronic inflammations of the cervix, often the infection does not penetrate to above the internal os, and there is present a chronic cervical catarrh. This often leads to a chronic inflammation of the parametritic tissue.

The treatment consists in attention to the erosion, if present, puncture and cauterization of cysts that are prone to form, and dehydration of the cervix by glycerin tampons.

Inflammation of the Parametrium.—If there is inflammation of the parametrium, this is benefited by the use of glycerin tampons applied three times a week. They are allowed to remain for 12 to 24 hours, and hot copious vaginal douches are taken. Gentle massage may be employed to stretch the indurated ligaments.

Affections of the Uterus

Inflammations of the Uterus

Acute Endometritis

Etiology.—Acute endometritis is an inflammatory process of the mucous membrane of the uterus, caused as a rule by the gonococcus, streptococcus, staphylococcus or colon bacillus. The gonorrheal form is discussed elsewhere in this volume.

Acute endometritis is a result, generally, of bacterial invasion complicating labor, abortion, or intra-uterine manipulations and operations. The prophylaxis is self-evident. Faultless technic in obstetrics and gynecological operations cannot be too strongly insisted upon. A frequent cause is the retention of placenta or membranes and blood clots in the uterus. Sometimes a degenerating tumor undergoes saprophytic invasion.

Prophylaxis and Treatment.—The primary indication in post-abortion infections of the endometrium is the emptying of the uterus of débris. The condition then demands rest in bed, attention to the bowels and fluid diet. Stimulation may be demanded.

The sapremic cases usually clear up when the uterus is emptied. But

a streptococcus infection is a grave affair and a long siege must be prepared for. Consequently the diet must be nourishing and easy to digest and assimilate. Small quantities of alcohol are beneficial. If the organism is known, antisera may be administered. Park recommends packing the uterus with gauze soaked in antistreptococcus serum, after the preliminary manual curettage, and irrigation. After this preliminary procedure intra-uterine treatment is not recommended, though many authorities advocate hot vaginal douches several times a day, with antiseptic solution—lysol or bichlorid of mercury, etc., and with intra-uterine douches with a double running catheter.

The etiological factors that will produce an inflammation of the endometrium will operate to cause an extension of the infection to the myometrium—an *acute metritis*. Indeed an acute endometritis precedes the graver affection. The treatment is the same. If, however, any localization of pus formation can be determined, then surgical interference is necessary.

Chronic Endometritis

It is difficult to give a good classification of chronic endometritis. It can be demonstrated that the menstrual cycle produces changes in the endometrium that formerly were considered pathological.

Various Forms.—A good working classification is as follows:

(1) A GLANDULAR HYPERPLASIA OF THE ENDOMETRIUM resulting from congestion due to uterine displacements, to tumors, to subinvolution following labor or abortion, and lastly perhaps to overstimulation, by ovarian secretion.

These cases are apt to be associated with menorrhagia, and possibly metrorrhagia.

The treatment is the removal of the cause, the correction of displacements, and so forth, combined with a curettage, to allow a healthy endometrium to grow under the more favorable conditions.

Medicinal measures for the control of bleeding will be found under Menorrhagia and Metrorrhagia.

(2) A condition which may be called CATARRHAL ENDOMETRITIS. This is a real inflammatory process and is caused by the activity of bacteria of low virulence or by saprophytes, or it may be the aftermath of an acute septic or gonorrheal endometritis. This type is more apt to be characterized by a discharge than by bleeding.

The best treatment is tamponade and douches, to improve the tone and health of the uterus. Some authorities advocate intra-uterine applications of tincture of iodin, or some of the silver salts.

(3) Lastly, there is an INTERSTITIAL FORM OF ENDOMETRITIS where there is overgrowth of fibrous tissue. This is associated with a general uterine fibrosis very often, and will be discussed under that heading.

It is conceivable, of course, that more than one of the conditions may be present in the uterus.

Chronic Met itis

Chronic metritis, uterine fibrosis or chronic metro-endometritis, is characterized by a general replacement of muscle and elastic tissue by fibrous tissue. A stained section of such a uterus resembles a bit of tissue taken from a discrete fibroid.

The endometrium partakes of this general fibrosis.

The prominent symptom is bleeding—first menorrhagia, then metrorrhagia and perhaps postponement of the menopause.

Treatment.—Medical treatment should be tried first, as outlined under Menorrhagia and Metrorrhagia. If unavailing, curettage may be beneficial—especially repeated curettage. If no relief follows, hysterectomy is the last resort.

If this condition occurs in young women, as it sometimes does—though the usual age is 35 to 45—the palliative measure of resecting part of each ovary may be tried before the radical operation is done.

Uterine Polypi

Uterine polypi may be mucous or fibroid in character. They present no characteristic symptoms and are found protruding from the cervix at a vaginal examination made for the purpose of establishing the cause of an existing leukorrhea with hemorrhage.

Treatment.—Pedunculated growths should be twisted or cut away; sessile polypi may be excised.

Fibromyomata of the Uterus

Etiology.—Fibromyomata uteri are tumors of the uterus composed of fibrous and muscle tissue, either of which may predominate—usually it is the fibrous tissue. They originate in the myometrium, and may develop there or be pushed outward to become subperitoneal or inward to become submucous, or more rarely become detached from the uterus and obtain their blood supply elsewhere, as from the omentum.

The cause of these growths is not definitely known, and no rules for prophylaxis can be prescribed.

Treatment.—The treatment of fibroids is surgical when certain indications are present. They may be stated briefly, as follows:

Pain from stimulation of uterine contraction, as in submucous variety.

Pressure on neighboring organs, as bladder and rectum, ureter, urethra, and in pelvic nerves.

Bleeding.

Growth, either rapid growth, or gradual growth to considerable size.

It sometimes happens, however, that operation is contra-indicated even

in the presence of one or more of these symptoms. Then it becomes necessary to employ symptomatic treatment.

For example, it is usual for fibroids to involute as the uterus undergoes atrophic changes after the menopause. So if symptoms present in the latter few years of uterine activity are not too severe, they may be treated palliatively and the necessity for operation obviated.

For the control of bleeding, the reader is referred to the subjects of Menorrhagia and Metrorrhagia.

Pain from uterine contractures, if severe, may be relieved by sedatives.

Pressure occasionally may be relieved by correcting a displacement caused or aggravated by the growth.

There is no adequate measure for *controlling the growth of fibroids.* A rapid increase in size is significant of degenerative changes, as sarcomatous, and the presence of a large growth indicates operation without respect to age.

It is obvious then that palliative treatment is seldom justifiable in fibromyomata giving rise to severe symptoms.

Uterine Displacements

Any deviation from the physiological position of anteversion-flexion of the uterus may be termed a displacement.

Flexions have to do with the relation of the body and the cervix; versions and prolapses express the position of the uterus as a whole in the pelvis.

Pathological anteversions, and lateral flexions and versions as a rule are secondary to some condition in the pelvis, which pushes or pulls the uterus out of place. For example: tumors and cysts will push a uterus forward or to the side; an inflammatory process will draw a uterus to one side, or indeed backward.

Anteflexion.—The uterus, to be pathologically anteflexed, must lack mobility between the uterus and cervix, the angle looking forward. The condition is associated with undeveloped uteri, and the treatment is discussed under Dysmenorrhea and Sterility—which are the symptoms most prominent produced by pathological anteflexions.

Backward Displacements.—Retroversion and retroflexion may be congenital, but more often are acquired.

Much may be done to prevent the occurrence of the acquired form by proper treatment after labor and abortion. On the fifth day postpartum and thereafter for six weeks the patient should lie flat on the abdomen twice a day, beginning with five minutes at a time and increasing gradually to twenty minutes. This encourages the heavy uterus with its relaxed ligaments to fall forward and involute in that position. If there is tendency for the uterus to fall backward after the patient is out of bed, the knee-

chest position should be assumed night and morning for five minutes at a time while deep breathing is practiced.

A retroverted or retroflexed uterus that is movable should be replaced and held in position with a suitable pessary. The Albert Smith pessary usually meets all indications.

As a rule the uterus can be replaced with the patient in the dorsal position. The first two fingers of the right hand are introduced into the vagina, posterior to the cervix, and pressure is made upward on the fundus. The index finger is then slipped in front of the cervix and pressure everted backward. Forward pressure is aided by the left or abdominal hand, when the fundus is brought up sufficiently by the preceding movements.

If difficulty is encountered, the result may be accomplished with the patient in the knee-chest position. If these means fail, grasp the cervix with a volsellum and pull downward. This straightens the uterus and enables one to lift the fundus more easily.

The pessary is inserted when the uterus is brought well forward.

To determine whether or not the pessary is a suitable one the following points must be noticed: it should hold the uterus in position; it should not press against bony structures; it must be comfortable; the patient should be unaware of its presence. A good test is to see if the patient can cross one knee over the other while sitting. A pessary may be worn indefinitely if it is comfortable and holds the uterus in position. But for the first few months it should be cleaned and replaced after each menstrual period. Then it may be worn for two or three months without replacing.

Not infrequently it may be impossible to replace retroverted or retroflexed uteri, because of inflammatory adhesions. These must be treated by tamponade, douches and manipulations before the uterus can be brought forward and held there. If a posterior parametritis is present, this must be cured before the pessary is used, even if the uterus can be put in position. Sometimes a large subinvoluted uterus will not stay in position, the fundus flopping back over the posterior bar of the pessary. The indication is to reduce the congestion and stimulate contractions of the uterus by tamponade, douches, and uterine tonics. A uterus with small fibroid, not felt on examination, will resist conservative treatment.

If after a thorough trial conservative treatment is unavailing, operation is indicated.

The Gilliam operation or some modification is recommended. Time and annoyance is often saved by an early decision of operative interference.

Prolapse of the Uterus.—Prolapse of the uterus is the descent in the axis of the vagina. The uterus is generally in line with the cervix, though there may be anteflexion or retroflexion.

The *first degree* of prolapse or descensus is when the uterus and cervix are in the axis of the vagina, and there is relaxation of the supporting structures, allowing descent. The *second degree* is when the cervix appears

at the vulva, and the *third degree,* or procidentia, is when a part or the whole of the uterus is outside the vulva.

Prolapse of the uterus is generally accompanied by some or all of the following conditions: cystocele, rectocele, or descent of the anterior and posterior vaginal walls; hypertrophied or lacerated cervix—all dependent more or less on the same causative factors. The prophylaxis of these conditions depends upon the practice of good obstetrics, the proper application of forceps, the preparation of the bladder and rectum, and the protection of the perineum.

Any treatment of prolapse should aim to overcome the underlying causes, that is, lack of support below, lack of support above, and increased weight of the displaceable parts of the pelvic contents.

Many women can be made comfortable by the use of pessaries. The same precautions obtain as in the use of pessaries to overcome retrodeviations.

In prolapse of the first degree, if there is little cystocele or rectocele, an Albert Smith pessary often answers the purpose, but if of greater degree, a ring pessary is more suitable. This failing, a Gehrung pessary may meet the indications. A good proportion of patients suffering from prolapse consists of elderly women; in such, especial care must be taken to obviate pressure sores which are prone to occur from the senility of the vaginal mucous membrane.

Only too often no manner of ring will hold up a prolapsed uterus—indeed, a ring will not be retained in the vagina. This as a rule is because the perineum does not furnish sufficient support. Obviously operation is indicated when a pessary will not hold the structures in place. In general it may be said that operation is always advisable if the patient will consent, as the use of a ring—especially in second and third degrees of prolapse—is palliative and not curative, as it may be in the case of retrodeviations. Of course it is understood that the patient must be a good operative risk.

There is a notable exception, however, to this general rule. If a woman is in the last few months of her child-bearing period, it is best to make shift with palliative treatment, until the menopause is reached. The reason for this is that, when parturition does not have to be considered, it is possible to correct the condition surgically with far greater assurance of a cure by a procedure that would make future pregnancies impossible.

Gonorrheal Infection in the Female

Prophylaxis

Space will not permit a discussion of the merit of segregation of prostitutes or of the ways and means of abolishing or regulating prostitu-

tion. What concerns us more here is the individual case. A man or woman with gonorrheal infection should be subjected to rigid tests before he or she is pronounced cured. A person who knowingly infects another should be punished. A wife infected by her husband may reinfect him after he is cured. She might then be open to the suspicion of infidelity unless this probability is appreciated.

Treatment of Gonorrheal Infection in Adult Females

Gonorrheal Urethritis

As long as we can keep the gonorrheal process limited to the external genitals and cervix, there is little to fear in the way of severe complications.

During the acute stage of gonorrheal urethritis local treatment is not recommended, except in the form of douches. Rest in bed is essential. The diet should be bland, with plenty of water. Spices and alcohol are prohibited.

The home treatment consists of douches and suppositories:

℞	Pulv. aluminis	ʒiv	120,0
	Zinci sulfat	ʒi	30,0
	Cupri sulfat	3iv	15,0

Sig.—One tablespoonful in 2 quarts of water twice a day.

Lactic acid (1 to 1,000), or tincture of iodin (2 to 1,000) may be used as an injection.

℞	Protargol	3i	4,0
	Butyr. cacao	3xii	48,0

M. Ft. suppos. xii.

Sig.—Insert one night or morning.

Urinary antiseptics should be given, such as urotropin (gr. v to vii) every three to four hours, or santyl (2 capsules three times a day).

In the subacute stage, topical treatment can be started. The particular preparation is a matter of choice, but the organic silver salts are recommended: argyrol (20 to 25 per cent), protargol (1 to 5 per cent). The most important part is the method of application. The medication should be confined to the urethra and cervix unless there is evidence of vesical involvement.

First the patient should void and the parts be cleaned, after the ureter is milked to remove the secretion. The silver may then be applied to the urethra with cotton wound on an applicator. This treatment should be repeated two or three times a week.

The restrictions in diet should be maintained. If a case is obstinate one should look to the urethral glands and Skene's ducts. With the endoscope localized areas can be treated directly with silver nitrate (1 to 5 per cent). The ducts can be split open for better drainage.

By prompt and careful treatment the infection can be kept localized, but at the first indication of vesical involvement, bladder irrigations should be started. A preliminary washing with saline or boric acid solution should precede the irrigation with silver; this removes the débris and expands the bladder. The silver solution should then be injected (2 or 3 ounces of a 1-10,000 solution), and allowed to remain five to fifteen minutes and then voided. This may be done three times a week or daily if necessary.

In the acute and subacute stages, pain and tenesmus are distressing symptoms. Tincture of hyoscyamus in ten or fifteen drop doses may be given every 3 hours. If the urine is highly acid, potassium acetate or citrate may be combined, ten or fifteen grains to the dose. Hot vaginal douches are of benefit and belladonna and opium suppositories may be necessary.

Urinary antiseptics must be given, preferably urotropin (v to vii grains), every three or four hours.

In the chronic stage irrigations of nitrate of silver seem to do better work. Beginning at 1 to 5,000, the strength may be gradually increased to 1 to 1,000, or even 1 to 500. Progress can be watched by the cystoscope and if necessary ulcerated area or localized inflammations may be treated directly through the endoscope with silver nitrate (1 to 5 per cent).

Hematuria can be controlled by injecting two or three cubic centimeters of (1 to 1,000) adrenalin solution.

Surgical precautions should be preserved in all procedures to prevent the infection from spreading.

Vaccine treatment is so far unsatisfactory.

Gonorrhea of the Cervix and Uterus

There are two important considerations when the infection reaches these parts: first, it is difficult to tell whether the cervix alone is involved, or whether the infection extends to the endometrium; second, whether the treatment should be radical or conservative. Many good authorities advocate curettage, irrigation and packing with medicated gauze. The gonococcus travels by direct extension along the mucous membrane, and a well cleaned out uterus ought to insure against involvement of the adnexa.

However, *conservative treatment* is recommended.

In the acute stage rest in bed is necessary. Cold should be applied to the lower abdomen by ice bag or ice coil. The bowels should be evacuated daily by enemata. The diet should be restricted, as in any acute infection.

If the discharge is considerable it can be removed by tepid douches of saline or boric acid solution.

As the acute symptoms subside the cold applications should be discontinued and efforts should be made to improve the tone and nutrition of the uterus. This can be done by hot sitz-baths, hot vaginal douches and by glycerin tampons.

Bleeding may be a troublesome symptom. Stypticin (gr. iii) three times a day should be given. Others advise intracervical and intra-uterine applications of silver salts. But the more conservative treatment as outlined above is advised.

Gonorrhea of Tubes and Ovaries

Practically all authorities are agreed that when the adnexa are involved, conservative treatment is the only procedure to be thought of.

Rest in bed, ice coil to the lower abdomen, fluid diet, and catharsis by enemata are essential. Frequent pelvic examinations should be avoided. Intra-uterine treatment, if used before, should be stopped.

Even if there is peritoneal involvement, it usually recedes under this treatment and the life of the patient is seldom in danger.

If at any time the tubes become distended with pus and sink into the culdesac of Douglas, posterior vaginal section with drainage and packing is indicated.

Even if no complications arise the patient should be kept in bed until the temperature has been normal for seven to ten days. Active life should be resumed gradually. Excess inactivity, intercourse, or exposure may cause a relapse.

Pain is troublesome, although the ice bag relieves it in great measure. Opium should not be given, as the recovery may be protracted, and there is always a chance that the patient may be an invalid for years. Dependence must be placed on the non-habit-forming drugs that relieve pain.

In the chronic stage, when the inflammation has subsided, resolution can be aided by daily hot vaginal douches, and tamponade done three times a week. Only too often, however, some damage results. This may be of varying degrees of severity. The tubes may be left in such a condition that future pregnancy is impossible, though other subjective symptoms may be absent. On the other hand the condition may incapacitate the woman for whatever sphere of activity she is engaged in.

To enumerate some of these sequelae: a chronic tubal infection or tubo-ovarian infection with more or less perimetritic involvement causes sterility, retrodisplacement of the uterus, pelvic pain, headache and discharge, with possibly menstrual disturbances. The tubal inflammation may be interstitial or catarrhal and if the abdominal ostia are sealed, results in hydrosalpinx or pyosalpinx. The ovaries may participate with a result-

ing tubo-ovarian or ovarian abscess. Although the original infective agent has become sterile, those chronic abscesses may undergo secondary infection from other pus-forming organisms, necessitating surgical intervention.

In general, operation should be conservative. If possible the function of maternity should be restored, but even if conditions allow of plastic work on the tubes or ovaries, no great hope of future pregnancy can be held out. As much as possible of ovarian tissue should be saved. Do not hold as too weighty the arguments for retaining the uterus if pregnancy is impossible. At best, it serves as something to menstruate from in many cases, and on the other hand may be the source of an intractable discharge.

Gonorrhea in Female Children

All cases of vaginitis in children are not due to the gonococcus. A certain number may be due to other pathogenic organisms, to saprophytes, to uncleanliness, to trauma or to foreign bodies. The exanthemata or a poor state of nutrition may predispose to a vaginitis. But the *gonorrheal infection* is the most important, as it is the gravest form.

Prophylaxis and Treatment.—Prophylaxis is of the utmost importance, as the infection may run like wildfire in institutions and schools. In the first place every female child before admission to a hospital or asylum should be examined for the presence of a vaginal discharge. If present, a smear should be taken and if gonococci are found the child should be isolated—if admission is practical. Under the strictest watching infected cases will be unwittingly admitted, and the contagion will be spread.

What precautions must be taken to prevent epidemics in children's wards? Cases known to be infected should be strictly isolated. This applies to linen and its disposal, to nurses and attendants. Routine smears should be taken from all other children once a week. Each patient should have her own thermometer kept in a separate receptacle. Irrigation tubes and the like must be boiled before and after using.

What is the best method of treatment of gonorrheal vaginitis in children? In the ordinary run of cases it is best to keep the parts clean and dry with boric acid water and boric acid dusting powder and, in addition, to administer an autogenous or stock vaccine (5 to 100 million in intervals of 3 to 7 days). Others advocate local treatment on the general principles of gonorrheal infection in the adult—that is, the use of various salts of silver to the infected area. The external genitals should be cleansed by a bath to remove secretion and painted with argyrol or protargyrol. Vaginal irrigations should be administered through a rubber urethral catheter and allowed to balloon up the vagina and bathe the cervix; thus the folds of the mucosa are penetrated by the solution. Boric acid is used first to remove the débris. This is followed by argyrol (20 to 50 per cent) or

protargyrol (1 to 2 per cent). This should be done every day. As the discharge becomes thinner silver nitrate (1 per cent) can be substituted for the organic preparation.

A cure cannot be pronounced until repeated smears from the cervix are negative.

All napkins, towels, etc., should be boiled, as part of the laundry process. In the presence of an epidemic diligent search must be made for the source or sources of infection. Outside of institutions the infection can easily be transmitted in domestic surroundings through carelessness of the diseased. Mothers, fathers, sisters, and brothers may innocently and ignorantly communicate the disease.

Other precautions are:

(1) To make specific vaginitis in children a reportable disease.

(2) To issue printed instructions to parents of infected children as regards preventive measures.

(3) To investigate probable origin with a view of safeguarding others.

(4) The adoption of a U-shaped toilet seat and the use of paper coverings for lavatory seats.

(5) The instillation of a drop of a two per cent argentic nitrate solution in the vestibulum of new-born girls whose mothers have gonorrhea.

The problem of preventing the spread of specific vulvovaginitis in school children has not as yet been solved.

Affections of the Tubes

(*Exclusive of Gonorrheal and Tuberculous Salpingitis*)

Gonorrheal salpingitis and its complications are discussed under the heading, Gonorrhea in Adults, and this constitutes the great majority of tubal inflammations.

However, tubal infections may result from invasion of the staphylococcus, streptococcus or the colon bacillus. Such infections may follow labor, abortion, and instrumentation, obstetrical or gynecological, or result from an extension from neighboring organs, such as the appendix. The inflammatory process is rarely confined to the tubes alone, but may involve the ovaries, the perimetrium and the parametrium. Further discussion will be found under the heading, Pelvic Inflammations in this section.

Affections of the Ovaries

Inflammations of the ovary usually are an accompaniment of tubal disease, of the peritoneum or other neighboring structures. The treatment

is that of pelvic inflammatory disease, which will be discussed more at length in the chapters on Salpingitis and Gonorrhea.

Tumors of the Ovary and Broad Ligaments.—The treatment is surgical removal. Even if a cyst or tumor is giving no symptoms it is better out than in, because of danger from twisted pedicle, strangulation and peritonitis, secondary infections and hemorrhage; also it must be borne in mind that solid tumors are apt to become malignant and some cystic tumors may undergo malignant degeneration.

Prolapse of the Ovary.—The ovaries may occupy an abnormally low position from one or more of several causes. An ovary may fall from its own weight from inflammations, congestion, or cystic changes, and in its posterior position it will become further congestive from interference with blood-supply or may be held there by adhesions. It may be drawn back with a retroflexed or retroverted uterus. Very commonly the relaxed condition of the ligaments after pregnancy will allow excursion downward.

The indications are to get the ovary back in place and to keep it there. A heavy congested ovary can be reduced in size by tamponade and hot douches. If the uterus is displaced backward it must be brought forward and held there—if not by manual replacement and a pessary, by operation.

Pelvic Inflammation

Pelvic Cellulitis or Parametritis

Pelvic cellulitis is an inflammation of the connective tissue of the pelvis —the parametritic tissue.

Acute Cellulitis.—Acute cellulitis occurs as the result of infections introduced from lacerations at labor and abortion or from obstetrical or surgical instrumentation. It may or may not go on to suppuration.

Prophylaxis.—The *prophylaxis* is evident then: careful asepsis in all obstetrical and surgical work, as well as skillful and timely use of aids to delivery.

Treatment.—The indications are: rest in bed, the bowels should be kept open by catharsis or enemata—as fecal accumulations increase the pain. The diet should be light, but supporting.

When pus formation is detected, it should be treated by surgical procedures, vaginal section, and drainage.

Chronic Cellulitis.—Chronic pelvic cellulitis, most commonly seen as a posterior parametritis, or inflammation of the uterosacral ligaments, is often seen in conjunction with endocervicitis, and is discussed under that topic.

Pelvic Peritonitis or Perimetritis

Pelvic peritonitis or perimetritis is an inflammation of that part of the peritoneum situated in the pelvis. It results from tubal inflammation,

gonorrheal, tubercular or puerperal; from extension of the inflammation of infected ovarian cysts, or from new growths, from pelvic cellulitis, and also from the appendix.

Prophylaxis.—The prophylaxis is the same as given above, under Pelvic Cellulitis.

Treatment.—The indications for treatment are in a measure the same as above; however, pain is apt to be a more prominent symptom. Care must be taken that the use of opiates does not do more harm by its constipating effects than good from the anodyne action.

The indications for operation are hard to define. One must be guided by the general condition of the patient, taking the pulse more into consideration than the temperature.

The after-results of pelvic peritonitis, no matter what the cause, are seen in those cases where the uterus and adnexa are bound down by adhesions. Such conditions resist medical treatment by douches, tamponade and manual manipulation and only too often come to operation with the result of finding hopelessly diseased tubes, and ovaries destroyed.

Pelvic Hematocele

Etiology.—Pelvic hematocele in the vast majority of cases is a result of ectopic gestation, when the blood collecting in the posterior culdesac becomes walled off by adhesions.

Treatment.—If the accumulation of blood is small and not increasing, expectant treatment may be employed—rest in bed, ice coil to the abdomen, and later hot vaginal douches.

The incident of suppuration must be recognized, as this necessitates vaginal section and drainage.

When a hematocele is observed to be increasing in size, laparotomy is indicated in order to secure the bleeding point.

Ectopic Gestation

Definition.—Ectopic gestation means extra-uterine pregnancy in the tube or in the ovary, or between the tube and ovary, or between the tube and uterus, primarily, or secondarily, in the broad ligament or abdominal cavity.

Prophylaxis.—There is little to be said on the prophylaxis of ectopic gestation. Recent work is showing that the cause of this interesting condition is the occurrence of misplaced imbedding areas in the tubes—and more rarely in the ovaries—from aberrant development of the müllerian ducts.

Treatment.—In general the treatment of ectopic gestation is to operate

as soon as possible. There are exceptions to this rule. The constitutional reaction resulting from tubal rupture results from both shock and hemorrhage. If the picture of shock is uppermost it is advisable to wait until the patient has rallied before operating—the additional shock of the operation may prove overwhelming.

It is not always easy to determine which factor is responsible for the condition of the patient. Therefore this general rule may be laid down: If the patient is in poor condition, it is advisable to wait; if there is a tendency to improvement it may be assumed that recovery from the shock is taking place and it is safe to wait until the patient has reacted. If on the other hand there is no improvement, one must operate without further delay. When the bleeding point is secured means may be employed to stimulate and replace the lost blood by hypodermic medication and by infusion or transfusion, depending upon the exigency of the indications.

When the pregnancy has advanced beyond the sixth month, the life of the child must be considered. If there is no immediate indication for operation and the child is alive, pregnancy should be allowed to go on to eight and one-half months' gestation, if the patient can be kept under careful observation. At that time spurious labor may be anticipated, and a live child secured.

Abortion—Miscarriage

Definition.—The expulsion of the fetus in the first months of pregnancy from divers causes, such as syphilis, traumatism, pelvic tumors, acute infectious disease, etc.

Symptoms.—Hemorrhage and pain are the principal symptoms. According to the duration of pregnancy these symptoms will vary in intensity. When abortion occurs after the sixth month, we speak of premature labor.

Prognosis.—In inevitable abortion the fetus is destroyed. The dangers to the mother are sepsis and bleeding. The remote dangers are subinvolution of the uterus, endometritis, and sterility.

Treatment.—The prophylactic management includes the correction of any known cause. If the patient has aborted a number of times, rest and the avoidance of sexual intercourse and of bicycle riding should be insisted upon. Antisyphilitic measures are indicated in that class of cases throughout the natural term of pregnancy. In *threatened abortion* the patient should rest in bed, and opium and belladonna in the form of rectal suppositories should be administered, or morphin given hypodermically. In *unavoidable abortion* the cervix is patulous, and a light tamponade of the uterine cavity with iodoform gauze is readily accomplished by means of a hollow tampon carrier. Uterine contractions will expel the contents of the womb. In case of severe hemorrhage tamponade of the vagina may be added to the uterine tamponade. In unavoidable abortion ergot may be

given before and after the expulsion of the ovum. Retained placental tissue requires removal by means of curettage.

In cases of labor and abortion antiseptic precautions should be taken as follows: For use on the vulva, the mixture consists of one dram of chlorid of calcium and two drams of the U. S. P. (36 per cent) preparation of acetic acid to the quart of lukewarm water. For hand disinfection a solution of double this strength is employed, following the usual cleans-

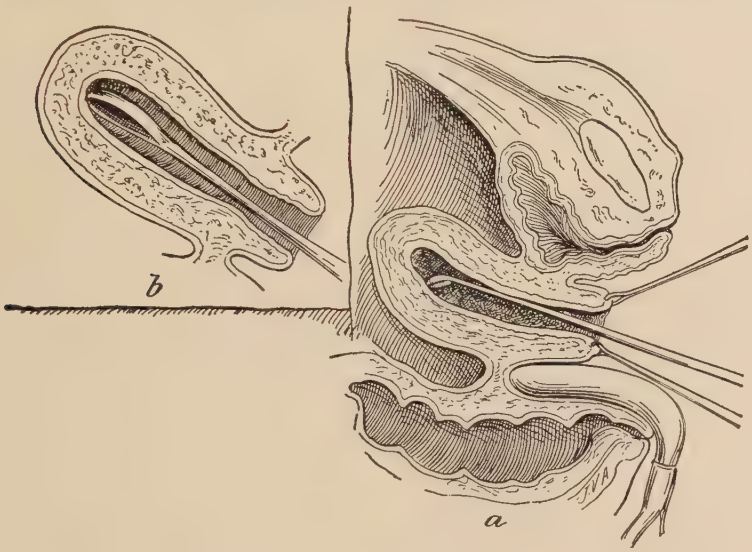


FIG. 142.—CURETTAGE. (After Morrow, "Diagnostic and Therapeutic Technic," published by W. B. Saunders Co., Philadelphia.)

ing with soap and water. After the hands have been immersed in the solution for five minutes, they should be rinsed in plain water or a dilute lysol solution, as the chlorin which is set free will readily attack linen and corrode instruments.

Management of the Breasts

If the nipples are inverted, attempts should be made during the last few months of pregnancy to draw them out by massage and with a breast pump. If this fails to correct the condition, a breast shield may be used during the puerperium.

After the birth of the child, the secretion for the first forty-eight hours or so is scanty. The child should nurse for the first time six to eight hours after birth, and for five minutes at a time every four hours thereafter. After the second or third day, when the milk starts, the child may be put to the breast every two and one-half hours. It may be found more

beneficial to adopt two hour or three hour intervals, depending upon the ability of the child to digest.

To guard against infection the nipples should be bathed, before and after nursing, with boric solution and during the intervals covered with squares of gauze smeared with sterile albolene or vaselin, held in place by a breast binder. In addition, the baby's mouth should be washed with a piece of cotton moistened with boric solution.

Sore and cracked nipples are treated by applying glycerite of tannin or witch hazel compresses. Silver nitrate (1 to 2 per cent) may be applied. A breast shield may be used when necessary.

If the breasts become unduly engorged and distended, "caked-breast," they should be emptied by massage or the breast pump. Firm support with a binder, limitation of fluids and free catharsis by salines are necessary. A light ice cap will relieve pain and limit the possibility of suppuration. If pus forms it should be evacuated and drainage established. If for any *good* reason it is undesirable to have the child nurse, the breasts may be dried up by pinning the breast binder very tightly, limiting the fluid intake and opening the bowels freely with salines. Other than the tight binder, no local applications are advised (*see also* Breast Feeding in Section I on Bedside and Office Technic).

Section XI

Disturbances of the Locomotor Organs

The treatment of tuberculous, luetic and malignant lesions, and those having their origin in the central nervous system is elsewhere discussed.

General Remarks on Prophylaxis and Treatment

Prophylaxis.—Locomotor disturbances located in bones, muscles, tendons and joints usually have trauma and infection as etiological factors.

Faulty circulation, faulty metabolism, neuropathic malnutrition, faulty internal secretion and toxemia are responsible for a host of locomotor ailments.

Infection may take place from the nasopharynx, through a broken skin, or from an internal focus of infection, or infectious fevers. Bacteria and toxins are carried by the circulating fluids to all tissues.

Dental, tonsillar, glandular and intestinal septic and toxic material readily finds foothold in locomotor organs under favorable conditions.

Hygienic living and well directed efforts to prevent oral and nasopharyngeal sepsis, are the main theoretical and practical *preventive measures.* To live in damp and dark apartments is a direct menace to health.

Treatment.—Treatment concerns itself with a large number of remedial measures, such as:

Rest and fixation.

Massage, vibration, active and passive motion.

Developmental and corrective exercises.

Hydrotherapy, local and general baths, douches, compresses, antiphlogistic measures, heat, cold, counterirritation, cupping, blistering, bloodletting, leeches.

Heliotherapy—the therapeutic and leucandescent lamp.

Electricity—faradic, galvanic, static, high frequency currents (thermopenetration).

Bier's suction hyperemia.

Dry hot air treatment.
Radium treatment, emanations, compresses.
Glandular therapy.
Sera and vaccines.
Bowel regulations.
Medication, internal and hypodermic.
Change of environment and occupation.
Suggestion therapy for neurotics.
Surgical therapy.

Affections of the Joints

Arthritis and Synovitis

Definition.—The inflammation of a joint.

Clinical Varieties.—The clinical varieties are acute and chronic, the acute being marked by pain, heat, redness, and swelling.

Etiological Factors.—The etiological factors are trauma, gout, gonorrhea, or rheumatic infection. It may follow the infectious fevers, scarlet, typhoid, pneumonia, also tonsillitis and pyorrhea alveolaris. The chronic form results from unresolved acute conditions.

Tuberculous and luetic arthritis are elsewhere discussed.

Acute Traumatic Synovitis

Definition.—An inflammation of the lining membrane of a joint characterized by heat, tenderness, swelling, and limitation of motion.

Treatment.—The treatment is rest in bed. The joint should be kept at rest by means of a splint made of wood, tin, or plaster of Paris. The shoulder may be fixed by strapping the arm against the body. The hip may be incased in a plaster spica, or the patient may be placed on a gas pipe frame, and traction applied to the leg and thigh. When the fluid begins to subside—and this may be hastened by a firm flannel bandage evenly applied over the splint—douching, sponging or packing with hot water, followed by *hand massage,* may be started for fifteen-minute periods, once or twice a day. They may be continued until the synovial membrane is practically normal. Hot air baking at a temperature of from 200°-250° F. for twenty to thirty minutes daily for two weeks—and later, every other day—is of use from the beginning. The removal of the splint is necessary for local treatment. The splint should be used until the pain has gone, when restricted motion may be allowed, first with the splint in place, then gradually without the splint. Fixation for too long a time leads to stiffness of the joint and atrophy of the muscles. When pain is very pro-

nounced in acute arthritis and synovitis a hypodermic injection of morphin will ease it.

Chronic Synovitis

Etiology.—This form is usually a secondary, rarely a primary, condition. Frequently it is a sequel to acute synovitis and occurs from incomplete recovery, from the formation of villous growths, joint mouse, etc. It is often a symptom of gonorrhea, syphilis, or arthritis deformans. Pyorrhea alveolaris has been thought to be a causative factor.

Prophylaxis.—This includes careful and complete treatment of the acute condition, hygienic home conditions and surroundings and nasopharyngeal and oral hygiene.

Treatment.—This is often discouraging to both patient and physician; the patient does not feel ill enough to go to bed and rest sufficiently long; besides, recovery and improvement are often too slow to suit the physician. It is purely a case of patience being a virtue.

The course of simple chronic synovitis with effusion is often shortened by aspiration of the fluid under strictly aseptic precautions and subsequent management, as for acute synovitis.

Aspiration, followed by irrigation with sterile saline (6 per cent) or a weak solution of the tincture of iodin (1 per cent), is a good procedure when the patient can be kept in a *hospital.* The iodin treatment is especially good in the chronic intermittent form.

After the effusion and the irritability have disappeared, massage and hot air treatment, douches, and hot fomentations may be begun. Hot dry air or thermopenetration followed by hand or vibratory massage is very effective. If foreign bodies are the cause of the trouble, they should be removed by the surgeon. Loose or floating cartilages should be dealt with surgically.

Articular Rheumatism

(*Rheumatic Synovitis*)

Definition.—An acute inflammation of the synovial membrane, accompanied by serous effusion. Inflammation of the endocardium and pericardium and other serous membranes is a frequent complication.

Clinical Varieties.—The clinical varieties are acute and chronic, mild and severe or septic.

Prophylaxis.—Oral and nasopharyngeal hygiene should be carefully looked after. Damp and dark living apartments are a direct menace to health.

Treatment.—Acute Form.—A patient suffering from this form of articular rheumatism should have absolute rest in bed on a soft mattress. Night gowns which open in front avoid the pain caused by changing them

when soiled by profuse perspiration. It is better to have the patient sleep between blankets and to have the joints wrapped in cotton or in flannel.

Diet.—Milk is the most suitable diet. To this may be added farinaceous foods, clam broth or oyster broth—without the clams or oysters, milk toast, barley or arrowroot, gruel, buttermilk, matzoon, and soups of various kinds. Lemonade, Vichy, and plain or carbonated waters may be freely given, also tea.

The return to normal diet must be gradual, allowing first fish, oysters, eggs and chicken, and later the other meats. Vegetables, such as baked potatoes, spinach, cauliflower tops, stewed celery, etc., may gradually be added. Fresh fruits may be allowed, but all sweets should be forbidden. Alcohol should be avoided except where its use may be required to stimulate a failing heart.

Medicinal.—In general the salicylates in some form or other have given the best results, but these are far from satisfactory as they upset the stomach very quickly. Sodium salicylate in capsules of 10 to 20 grains every two hours until the pain is relieved—then every four hours until the temperature begins to fall—gives excellent results in the early stage of the disease. Later on this dose must be reduced to 5 or 10 grains every three or four hours. The salicylates are frequently better borne if given in milk. Potassium bicarbonate may be given with the sodium salicylate to offset its bad action on the stomach mucosa.

The following formula will be found quite useful:

℞ Sodii salicyl.	.....	ʒiv	15,0
Potassii iodid	.....	℈ii	2,6
Potassii acetat	.....	ʒi gr. xv	5,0
Syrupi sarsaparillae	.....	℥i ʒv	50,0
Aquae	.....	℥i ʒv	50,0

M.S.: One teaspoonful in one-half a tumbler of water every 3 hours.

Salicin in 20-grain doses every two hours, until the pain is relieved, has often given good results; it affects the stomach less than does the sodium salicylate. For children it is probably the better drug to use (gr. 3 to 5). Oil of wintergreen—20 drops in milk every two hours—may also be given to adults.

Should the specific drug irritate the stomach it can be given in watery solution per rectum or by hypo, as follows:—*In acute cases* cocainize the skin to be punctured, and fifteen minutes later inject 10 to 15 c.c. of a 20 per cent sterile watery solution of sodium salicylate, and repeat at intervals of twelve hours.

The alkaline treatment consists of the administration of potassium bicarbonate in half drachm (2,0) doses every three hours with the salicy-

lates or the salicin. Opium in the form of Dover's powders or hypodermics of morphin may become necessary to relieve the pain. Bromural in 5 to 15 grain doses at night is a valuable mild sedative.

The local treatment in the acute stage consists of: cold or hot compresses, oil of wintergreen and cotton, antiphlogistin, splints to rest the joints.

A wet compress holding a saturated solution of magnesium sulphate relieves the pain in swollen joints.

Radium compresses containing from 30 to 100 micrograms are said to relieve pain—they are quite expensive however.

Sedatives.—The following sedatives may be given: *bromural* (gr. v to xv by mouth), also *codeonal* in severe pain, morphia sulphate (gr. ¼ subcutaneously). An ice bag should be applied over the heart region.

Cardiac complications are usually ushered in by rise of temperature and rapid, irregular beat. Pericardial friction and effusion may be looked for.

During convalescence specific medication may be stopped and dilute hydrochloric acid should be administered until the tongue is clean. If the swelling in the joints has practically subsided, heat in the form of an electric bath, or by leucandescent lamps, three or four times daily for fifteen minutes, often gives relief from the pain. In the later stages *baking* is very useful. Massage, when there is no more pain, may be instituted gradually, at first by the hand and later with the vibrator. Hot air and Bier's hyperemia treatment, thermopenetration with the high frequency current, are useful therapeutic measures.

In severe acute cases in adults 50 c.c. of a 4 per cent solution of collargol in 1,000 c.c. saline administered by the Murphy drip is valuable supplementary treatment. In desperate cases an intravenous injection of 20 grains (1,3) of *magnesium sulphate* in 200 c.c. of sterile water or an intravenous injection of *neosalvarsan* has given good results in several of the writer's cases.

In severe acute cases in children the following prescription deserves a trial:

℞	Sod. salicyl.	℥ii	8,0
	Pot. iodid	℥i	4,0
	Tinct. verat. vir. } Tinct. aconit. }	āā gtt. xv	āā 1,0
	Aquae	℥ii	60,0
	Syrup	℥ii	8,0

Sig.: One teaspoonful every 3 hours.

After recovery from an attack we must educate people with rheumatic tendencies in regard to preventive measures and predisposing factors.

Chronic Articular Rheumatism.—In chronic articular rheumatism the internal administration of salicylates is not of much benefit.

In chronic cases *with heart involvement* inject 10 to 15 c.c. of an oily solution [1] every twenty-four hours subcutaneously, as follows:

℞ Acid salicyl.	℥iiss	10,0
Ol. sesami	℥ii ℥v	80,0
Spir. vini rect.	℥i gr. xv	5,0
Camphorae	℥i gr. xv	5,0

Reports of favorable results from the *intravenous administration* of salicylates in rheumatic infection of the subacute and chronic types have been published.

Stock vaccines have been employed with apparent benefit and should be tried.

Every case of septic arthritis, commonly called rheumatism, is caused by a focus of infection somewhere in the body. It may be in the tonsils, ear, accessory sinuses, gastro-enteric tract, genito-urinary tract, or in the teeth. If the focus is found an antogenous vaccine is indicated.

Dr. Eugene Fuller, of New York, claims excellent results in absorptive chronic arthritis (also of the gonorrheal variety) from seminal vesiculotomy.

Dry hot-air treatment 200-300° F. administered every other day is indicated in most all forms of chronic arthritis.

Gonorrheal Arthritis

Treatment.—The patient should be put to bed and the inflamed joints immobilized by splints.

Cold wet dressings of diluted liquor plumbi subacetatis in conjunction with an ice bag are indicated for the relief of pain and swelling.

Internal medication with salicylates, aspirin, pyramidon may relieve pain, but has no specific action.

In the subacute stage hot-air baking is of some value. Protection, limitation of motion and a Buck's extension, to keep the joint surfaces apart, are advisable to prevent ankylosis. Aspiration to relieve pressure is of benefit. Murphy, of Chicago, injects after aspiration a two per cent solution of *formalin* in glycerin (twenty-four hours old), using 15 c.c. of the solution in the knee joint. He also uses an autogenous vaccine if the organism can be procured.

Free incision with drainage is not advisable as it tends toward a mixed infection.

In the chronic stage the treatment given for chronic synovitis—massage, douches, Bier's hyperemia treatment, etc.—is to be used.

[1] Formula of Dr. Seibert of New York.

Stock vaccines have been used with varied success. The dosage should begin with about 25,000,000 organisms and the injections repeated, with constantly increasing doses, every three to six days, according to the reaction and the results obtained.

Antigonococcus serum has not yielded as good results as vaccine, but it is occasionally very beneficial, and should therefore not be forgotten.

The large number of cases of gonorrhea in which the seminal vesicles have apparently acted as the local foci of infection has led Fuller and others to resort to perineal incision and drainage of these structures.

Other Forms of Infective Arthritis

Other forms of infective arthritis occur as complications in scarlet fever, cerebrospinal meningitis, influenza, scarlatina, erysipelas, puerperal fever, pyemia, septicemia, tonsillitis, and typhus fever. They are also seen in diphtheria, dysentery, mumps, glanders, and in measles.

Prophylaxis.—Proper treatment and sufficient length of time in bed during the acute stage of diseases in which arthritis may occur is probably all that can be done prophylactically.

Treatment.—These forms of arthritis occur during the active stage of the disease designated by their name. They range from mild to severe forms, and may give rise to pus. Pus should be evacuated, the joint drained—especially when dislocation has occurred from distention of the capsule. Wherever possible, extension by weights should be employed and the joint immobilized. In the hip joint an abducted position with outward rotation will tend to prevent dislocation. A plaster of Paris spica will be found serviceable. Cases without pus formation should be treated as acute arthritis cases.

Still's Disease

Still's disease is a type of infectious arthritis occurring in young children. Its manifestations are found in the large joints and in the muscles as well; bones and cartilages present no changes, as shown by the x-ray.

The onset is rarely acute, it is chiefly insidious. The characteristic features are stiffness and a fusiform swelling—the development is symmetrical. There is no tendency to suppuration or ankylosis. An enlargement of lymph nodes is found all over the body, also splenic enlargement. The muscles near the affected joint become atrophic; the children become markedly anemic; moderate fever with remissions is observed; eventually the inflammatory process subsides, but the joints do not completely return to normal.

Treatment.—The treatment is that of subacute arthritis

Arthritis Deformans

Definition.—A non-suppurative progressive affection of the joints, manifested by pain, swelling, and limitation of motion accompanied by stiff-

ness and deformity. It may be of infectious or metabolic gouty origin.

Varieties.—1. Polyarticular (chronic rheumatoid arthritis, arthritis nodosa, nodular rheumatism).

2. Monarticular (osteo-arthritis, hypertrophic progressive osteo-arthritis).

Fig. 143.—Arthritis Deformans (Case of Dr. E. H. Muse, Roanoke, Va.).

3. Polyarticular, characterized by synovial swelling, with a tendency to ankylosis (fibrinous arthritis).

4. Ankylosis arthritis (infectious arthritis). This variety may exist with the other varieties and is characterized by changes in the phalangeal joints of the fingers—the so-called Heberden's nodes.

General Treatment.—It is of considerable importance to get the patient into the best possible general condition. Drugs are indicated to combat anemia, debility, mental depression and constipation—for the latter the saline cathartics are best. The activity of the kidneys must be kept at its highest point to carry off the waste. The activity of the skin may be promoted by hydrotherapeutic measures, electric light baths, etc. A thorough clinical examination must be made with a view to locating and treating some septic focus or obscure chronic condition.

Local Treatment of Affected Joints.—Treatment of Acute and Painful Joints.—When not actually treating the affected joint this should be immobilized by means of a removable splint made of metal or of plaster of Paris and the joint put at absolute rest. Traction should be made whenever this is practicable, as in the case of the hip, knee, ankle, and shoulders. Hot-air baths daily for from twenty to forty-five minutes at 200° to 250° F. may be used at the outset. Hot-air douching, hot packs, or a flax-seed poultice kept warm with a hot-water bottle may

be used. This treatment may be followed by cold douching after the effusion has subsided.

Treatment of Chronic Joints.—A certain amount of exercise is beneficial, the limitation being set by the amount of pain caused. Passive and active exercises are best made after the affected joint has been baked or treated with the high frequency current when it is least painful and most limber. Massage daily for fifteen minutes by hand or gentle vibration may be instituted early, including all the muscles above and below the joint which may be atrophied. The Zander machines may be used by the patient. The Bier congestion treatment is of great value in both the rubber band and vacuum form. Whenever deformities exist the joint should be put in that position which is most serviceable for the individual patient as indicated by his vocation.

Fig. 144.—Arthritis Deformans.

When the diagnosis of arthritis deformans is established, the patient should be told that it will take years for a cure. A thorough clinical examination must be made regarding lues, systemic gonorrhea, alveolar and sinus disease, pus tubes, blood conditions, etc., with a view to locating and treating some septic focus or obscure chronic ailment as an underlying cause. If nothing definite is found the gastro-intestinal flora should be modified by administering the Bulgarian bacillus for a year or more and the general treatment should be carried out as outlined above. Radium treatment has not helped in the author's cases.

Perthes' disease (juvenile osteochondritis deformans of the hips) is treated as any other form of arthritis deformans.

Hydrarthrosis

(*Intermittent Synovitis*)

Definition.—A serous effusion occurring at more or less regular intervals, and attacking the knee joint most often.

Etiology.—Very little is known concerning the causative factors.

Treatment.—If rest, immobilization and local antiphlogistic measures, together with the administration of laxatives—quinia or potassium iodid—produce no improvement, an x-ray picture of the joint should be secured.

In the absence of a tangible source of irritation, such as a floating cartilage, aspiration of the fluid under strictly aseptic precautions is justified, followed by strapping with adhesive plaster to secure compression and immobilization until the irritability of the joint has ceased. Following this, massage by hand with gentle rubbing for fifteen minutes may be practiced, also hot air treatment and douching. Later, vibratory massage, the therapeutic lamp and high frequency currents may be tried. Any foreign bodies which have formed in the joint after repeated attacks must be removed surgically.

Neurotic Joints and Contractures

Neurotic joints and contractures are not uncommon, but they require keen and prolonged observation to make the diagnosis.

Treatment.—Suggestion, manipulation and divers forms of electricity and hydrotherapy, if applied with tact and patience, will reëstablish normal functions.

Rigid Spine

(*Spondylitis deformans*)

Definition.—A chronic, painful stiffening of the spine.

Etiology.—This is essentially a disease of middle life. Heredity does not seem to play a great rôle, although several persons in one family may be affected. Gout and rheumatism are sometimes forerunners of this condition. It may be of nervous origin and some think that it is a chronic infection from an undiscovered septic focus.

Treatment.—Fixation of the spine in the beginning is essential. A removable plaster of Paris jacket applied while the patient stands erect—not suspended—gives relief in some cases; in others, a light spinal brace is more bearable. In the milder cases a corset may suffice. Massage by hand may be useful, but forcible manipulation is painful and harmful and should be avoided. Heat applied up and down the spine by the electric lamp gives considerable relief.

General hygienic treatment is quite important. The administration of some tonic—such as the iron, quinin, and strychnin mixture, or arsenic and iron, or other iron products—is better than the coal tar products which seem to be of no use. Aspirin has been tried but found wanting.

Typhoid Spine

(*Spondylitis typhosa*)

Definition.—A painful affection of the spine occurring occasionally late in typhoid fever, with symptoms resembling those of Pott's disease.

Etiology.—The condition is a comparatively rare one and no definite cause has as yet been found. It may exist without any definite inflammatory signs, yet in others a kyphosis may be formed. It may be an osteomyelitis similar to that set up in other bones of the body during typhoid fever.

Treatment.—Some sort of fixation should be provided and the patient prevented from rolling and twisting the spine. This can be done by placing two sand bags on either side of the spine at the painful point, which, when adjusted to the proper height, give instant relief. Treatments with the electric leucandescent lamp have a very quieting and soothing effect and should be applied once daily for fifteen minutes.

If this ailment occurs in a child the patient may at once be placed on a gas pipe frame, as used for the treatment of Pott's disease. During convalescence if the trouble still persists a Taylor back brace may be applied. A plaster jacket will also give the necessary support, but this will be found uncomfortable and heavy.

Neurotic Spine

(*Neurasthenic Spine*)

Definition.—A painful condition of the spine in which no organic disease exists, but in which pain and fatigue are the principal symptoms.

Treatment.—It is frequently impossible to find the cause of the trouble, but usually some static error may be discovered. This may be a slight curvature of the spine, which exercises will benefit or a brace relieve. Shortness of one leg may be corrected by lifts in the shoe. Flat feet should be treated as outlined under that heading elsewhere in this section.

Stiff and Painful Shoulders

Etiology.—Among the many causes may be mentioned:

Injury or sprain of joint capsule
Infectious inflammation of joint
Fracture
Tenosynovitis

Subacromial and subdeltoid bursitis
Adhesions about the joint
Acromioclavicular arthritis
Arthritis deformans
Neuritis
Circumflex nerve paralysis.

Treatment.—To relieve pain morphin, phenacetin, aspirin, and bromids are used. A sling may be used during the day and a comfortable posture secured at night.

Massage, baking, cold compresses, hot applications, the high frequency current, and laxatives are salutary methods of treatment. Surgical interference may eventually be indicated—particularly in bursitis.

Hypertrophic Pulmo-arthritis

Definition.—A disease characterized by enlargement of the hands and feet and of the ends of the long bones, not involving the bones of the skull.

Etiology.—This condition occurs usually in adults and in the male sex. The disease usually is associated with or follows pulmonary affections, sometimes syphilis and heart disease, chronic diarrhea, and spinal caries.

Treatment.—No satisfactory treatment is known, as the pathology and etiology are obscure.

Muscle and Tendon Derangements

Tremors

Tremors are not infrequently observed in children during and after severe infectious diseases, and they usually subside when the afflicted child regains normal health.

Tremors beginning about middle life usually persist in spite of treatment, as do senile tremors.

Treatment.—Hygienic living, bowel regulation, good food, and mild massage will suggest itself as the proper treatment.

Motor Tics

Motor tics are observed in school children and occasionally in adults. Spasmodic contractures may take place in one muscle or in many muscles. Individuals so afflicted are usually anemic and neurotic.

Treatment.—If muscle spasms are due to some local irritation which can be eliminated the spasm will stop. If a local cause cannot be detected, the management must be general.

Hygienic living, rest for an overworked muscle, bowel regulation,

hydrotherapy, or massage should be secured. Iron and arsenic acid, the bromids, and phosphorus may be employed in the way of medication.

Intermittent Claudication

Etiology and Symptoms.—This condition is characterized by muscular weakness, lameness and even complete disability after short walks or slight exertion. In some cases it is due to a relative ischemia in the muscles. Aneurism of the iliac artery has been found in connection with this condition. Arteriosclerosis is present in the majority of cases.

Dr. J. R. Hunt, of New York, has drawn attention to *ischemic lumbago,* a lumbar type of intermittent claudication, which may be unilateral or bilateral in character.

The symptoms of intermittent claudication were ascribed to an interference with the blood supply of this region, either by disease of the lumbar arteries themselves or of that section of the abdominal aorta whence these vessels take their origin. In this manner a reduction in the quantity of blood circulating in the affected region is produced. The blood supply is sufficient when the muscles are at rest, but inadequate for the requirements of active muscular effort; hence the intermittent ischemic character of the symptoms.

Treatment.—The treatment, which is not always satisfactory, consists in the administration of potassium iodid, sodium nitrite, and nitroglycerin if the blood tension is high. Massage and exercises to strengthen and train the muscles when the condition is not due to an aneurism seem to help in some cases. The high frequency current is also indicated.

Painful Affections of Voluntary Muscles and Tendons

The Myalgias

(*See also Section XIII, on Minor Ailments*)

When we speak of *myalgia, myositis, muscular rheumatism, lumbago, torticollis, pleurodynia,* we use clinical terms without having a clear conception of the clinical pathology of such disturbances.

Muscle strain and hemorrhage, toxemia from faulty digestion and faulty metabolism, insufficient elimination, infection from without, vasomotor disturbances, are the plausible etiological factors in this group of ailments.

Muscular Rheumatism

Definition.—A painful affection of the voluntary muscles and of the fascia and periosteum to which they are attached.

Etiology.—Cold and exposure are looked upon as causative factors.

Toxic neuralgia of the sensory nerves of the muscles will produce the clinical picture of myalgia.

This toxic form of so-called "muscular rheumatism" is distinct from another form, for which the term *fibrositis* has been coined. In the latter distinct nodules or lumps can be felt in the muscle, which usually disappear after a course of massage. The toxic form shows no lumps in the muscle.

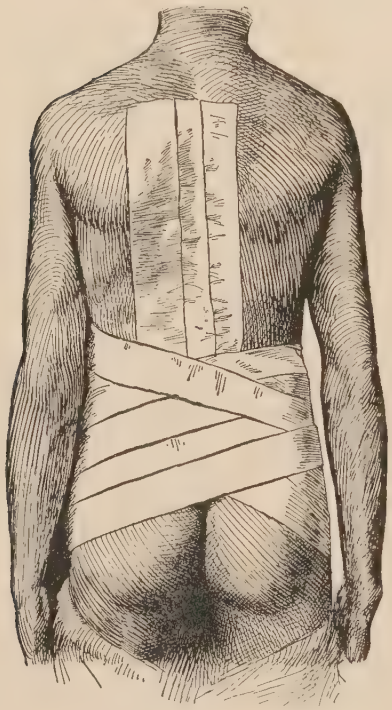


FIG. 145.—APPLICATION OF ZINC OXID ADHESIVE BANDAGE FOR MUSCULAR STRAIN AND MYALGIA. (After Hoxie, "Symptomatic and Regional Therapeutics.")

Treatment of Muscular Rheumatism and Myalgia

Medical Treatment.—The administration of antipyrin or phenacetin, or aspirin alone or in combination as a rule gives good results. In the severer cases an injection of morphin must be resorted to. Rest in bed, if possible, is to be desired from the outset, both for the rest it affords the affected muscles and for the purpose of instituting hydrotherapeutic and electrical measures. The saline cathartics should be freely administered. In intractable cases Bulgarian bacillus tablets may be given for a long period.

For many years it has been the author's practice to start treatment of toxemia or infectious disturbances by giving the patient an *initial dose,* as follows:

℞	Podophyllin	gr. ⅓	0,02
	Calomel	gr. viiss	0,5
	Quiniae sulf.	gr. viiss	0,5
	Pulv. aromat.	gr. iii	0,2

S.: Take in wafer.

Hydrotherapy.—Tepid baths from 85° to 95° F., lasting from fifteen to twenty minutes daily and followed by an alcohol rub or cool sponge give great relief. Hot dry packs for the same period are also very good. Dry heat applied locally either in an oven or hot-air apparatus or by means of a therapeutic lamp may be tried, the exposure lasting fifteen minutes and the heat raised as high as the patient can bear it.

Electricity.—Both the galvanic and the faradic current are of use. In the acute cases, however, the galvanic current applied for from five to ten minutes at a sitting will be found sufficient. The faradic current is applied with the brush electrode to produce counterirritation. Electricity may be applied daily but in the beginning of an attack it may be too painful to bear.

The high frequency and static currents are also useful. After the acute pain has subsided massage and physical exercises may be practiced and continued for a long time.

Lumbago

Etiology.—This form of myalgia is very common and its etiology is obscure. Men are more apt to have lumbago than women. Pain, which usually comes on after a strain or awkward movement of the body, may be very severe.

Treatment.—A morphin injection—gr. ¼ to ½ (0,015 to 0,03)—will promptly relieve pain, but this is not the best treatment. If the patient is willing to "bide a wee" it is a much better plan to give the *initial dose* mentioned under Muscular Rheumatism and to treat the case as one of localized muscular rheumatism. To begin with, dry cupping may be resorted to over the affected area.

The therapeutic lamp is also very helpful, followed by light hand, and later vibratory, massage. Hot-water bags and poultices are very comforting to the patient. Strapping with adhesive plaster for support gives great relief, especially in the ambulatory cases. Two-inch straps applied half-way round the body and overlapping the edges with two or three strips running parallel to and over the spine make a good stiff support. A Taylor back brace or any of its modifications has often given relief.

Torticollis

In its acute form a local massage with the thumb directly over the most acutely tender point frequently gives almost immediate relief. This treatment is painful at the outset but this soon wears off.

Hot fomentations, dry heat and gentle massage also give relief. The blowing of a constant stream of hot, dry air is also very good but requires a special apparatus. In chronic torticollis with contracture, operative treatment may be necessary.

Pleurodynia

The treatment for this condition is the same as in lumbago.

Hematoma of the Sternocleido Muscle

Etiology.—Hematoma of the sternocleido muscle is due to traumatism in childbirth (breach presentation).

Treatment.—The treatment is the same as in torticollis.

Myositis Due to Trichinosis

Etiology.—A localized inflammation caused by the *Trichina spiralis* becoming encysted in the substance of the muscle. The parasite's habitat is the hog. When the meat is eaten raw or imperfectly cooked the parasites develop in the intestinal tract and migrate, reaching the muscles about the sixth day, and there become encapsulated.

Symptoms.—Nausea, vomiting, abdominal pain, and diarrhea, are the first symptoms—muscular symptoms develop in one to two weeks (pain and swelling); irregular fever and albuminuria are usually present. Edema of the eyelids is an early symptom. The course is from two to eight weeks. Recovery is slow.

Prophylaxis.—The prophylaxis consists in avoidance of raw or poorly cooked pork.

Treatment.—Brisk purgatives are indicated in the early stage and should be administered for a week thereafter. Five grains of thymol in three grains of glycerin may be given every three hours. After the parasite is encapsulated in the muscles the treatment is symptomatic and supporting.

Myositis Ossificans

Definition.—An inflammation of the muscle characterized by calcareous degeneration of the fibers.

Forms.—This condition occurs in two forms. One which usually attacks young people and children seems to be confined to the interstitial tissue of the muscle, usually in the back and neck. No etiological factors have been discovered for this form.

The second form seems to have *traumatism* of some sort as an etiological factor. Local strain and irritation sometimes produce bony growths in the thigh muscles, the adductors of horsemen and the shoulders of soldiers, etc. Wherever these bony growths give rise to pain or disability, their removal surgically seems to be the only means for benefiting the condition.

Myoclonia

Definition.—An affection characterized by clonic contractions—chiefly of the muscles of the extremity, occurring constantly or in paroxysms.

Etiology.—The cause of this condition is not known. It occurs chiefly in males and has followed emotional disturbances, fright, or strain. Heredity has been noted in several generations.

Treatment.—No treatment at present known has any influence on the condition. If syphilis can be excluded a polyvalent internal secretion may be tried. Pituitrin and pineal gland extract deserve trial.

Myotonia

(*Thomsen's Disease*)

Definition.—An affection characterized by tonic cramp of the muscles on attempting voluntary movements.

Etiology.—Heredity seems to play a great part, as family groups, generation after generation, have been afflicted. The cause is obscure.

Treatment.—No satisfactory treatment is known.

Pituitrin or pineal gland should be tried.

Dystonia Musculorum Deformans

Definition.—An organic chronic affection of the central nervous system characterized clinically as a progressive torsion spasm, associated with tre-

Fig. 146.—Dystonia Musculorum Deformans. (Case of Dr. Marshall C. Pease.)

mor, choreiform and athetoid movements, sparing only the muscles supplied by the cranial nerves. This condition has been observed in older children and is progressive.

Treatment.—Treatment is unavailing. Pituitrin may be tried.

Paralysis agitans

Definition.—A functional disease of the muscular and nervous systems, characterized by tremor of the extremities, by rigidity of the muscles, abnormal postures and an unsteady gait with a tendency to fall, and by abnormal sensations of varying intensity.

FIG. 147.—ADVANCED CASE OF PROGRESSIVE TORSION SPASM; INVOLVEMENT OF THE TRUNK, NECK MUSCLES AND ALL FOUR EXTREMITIES. Note the bizarre, clownish attitude and the poorly developed musculature of the lower extremities. (Dr. J. Ramsay Hunt, *Jour. Am. Med. Assn.*, Nov. 11, 1916.)

Etiology.—Any traumatism, actual or psychic, or exposure may precede the affliction. Heredity may play some part, but no definite etiological factor has been found. A disturbance of internal secretions is suspected.

Treatment.—Treatment instituted with hopes of effecting a cure will meet with disappointment. Some of the symptoms, however, may be mitigated.

The tremor may be diminished by hyoscyamin (gr. 1/200) given every six hours and increased gradually until the tremor is somewhat diminished, and then continued at that point. The amount required to maintain relief varies in different individuals from three doses a day to six. Dryness of the mouth and pupillary dilatation are indications not to push the drug further. Codein (gr. 1/6) is valuable in conjunction with the hyoscyamin. Tincture of gelseminum (minims 10) or the tincture of veratrum viridis (minims 2 to 3) in water three times daily may stop the tremor. Cannabis indicum (gr. 1/4) three times daily for long periods is recommended. Parathyroid and other gland preparation should be tried in this obscure ailment.

Tenosynovitis

Definition and Etiology.—Tenosynovitis, or thecitis, is an inflammation of the synovial sheaths of tendons, which may be acute, subacute, or chronic, and usually results from strain or excessive unaccustomed use.

Symptoms.—The symptoms are pain and a peculiar dry crepitus upon motion.

Treatment.—Rest on a splint.

Counterirritation (tincture of iodin).

Cold compresses.

Vibratory massage.

Hot air treatment or thermopenetration.

Suppurative Tenosynovitis

Etiology.—Suppurative tenosynovitis results from an infection of a tendon sheath following a penetrating wound, or is due to extension of a suppurating felon.

Treatment.—The treatment is surgical: free drainage.

Chronic Tenosynovitis

Etiology.—Chronic tenosynovitis is usually of tuberculous origin.

Treatment.—The treatment is surgical if heliotherapy, x-ray and radium treatment have failed to cure this condition.

Formation of Ganglia

Definition.—Ganglia are small cysts which appear along the course of tendons.

Treatment.—Break the cyst wall by means of a sharp blow with a wooden mallet or book, scattering the contents which are absorbed. When ganglia recur excision is indicated.

Muscular Dystrophies

Definition.—Muscular wasting with or without an initial hypertrophy beginning in various groups of muscles, usually progressive in character and depending upon primary changes in the muscles themselves.

Etiology.—Heredity seems to be the only etiologic factor.

Clinical Forms.—

I. Dystrophia muscularis progressiva infantum
   1. *Hypertrophic form*
      (*a*) With pseudohypertrophy
      (*b*) With real hypertrophy
   2. *Atrophic form*
      (*a*) With primary involvement of the face
      (*b*) Without involvement of the face

II. Dystrophia muscularis progressiva juvenalis vel adultorum (Erb's juvenile form).

Treatment.—General measures aimed to support the health and nutrition of the patient are important and consist practically of a life in the country, with good food, moderate exercise and plenty of fresh air.[1]

[1] A Wassermann test should be made in every case. If this is positive antiluetic treatment is indicated, also internal gland preparations should be tried.

Hand massage daily for one hour to preserve the muscle tone must be persisted in for years. Electricity for the purpose of exercising the muscles may replace massage and often gives good results. Contractures may have to be treated surgically according to the best orthopedic principles, tenotomies and tendon lengthening being the usual form of

FIG. 148.—PSEUDO-HYPERTROPHIC MUSCULAR PARALYSIS. Characteristic Postures. (After Strümpell, "Text-book of Medicine.")

relief. The deformity of the spine may be corrected by means of a spinal brace.

Muscular Atrophy

(*Progressive Dystrophy*)

Definition.—A disease characterized by a chronic degeneration of the motor nerve tract.

Clinical Varieties.—These consist of: (*a*) progressive muscular atrophy; (*b*) amyotrophic lateral sclerosis; (*c*) progressive bulbar paralysis.

Etiology.—The cause is unknown. It usually affects adults past the thirtieth year—more frequently males than females.

Prophylaxis.—The prophylactic measures include: prevention of cold, wet, exposure, fright and mental worry.

Treatment.—The disease is incurable. In the spastic cases, systemic massage is most useful. Where a history of syphilis can be obtained, specific treatment by inunctions of mercury and the administration of potassium iodid may improve the condition. Internal gland preparations should be tried.

Derangements in Bone and Cartilage

Dwarfism—Achondroplasia—Chondrodystrophia fetalis

Definition.—A disease resulting in defective formation of cartilage at the epiphysis of the long bones, with failure of their normal growth.

Etiology.—The cause is unknown. It has been described by Virchow as fetal cretinism, by others as fetal rickets. Its course, however, may run throughout infancy.

Treatment.—The various internal secretion preparations should be tried in succession and in combination with potassium iodid given per rectum. Vitamine therapy by means of antolyzed brewers' yeast should be tried. *See* Section I.

Leontiasis ossium

Definition.—A rare condition characterized by hyperostoses of the cranial bones.

Etiology.—Nothing is known regarding the cause of this disease.

Treatment.—Internal secretion preparations and potassium iodid may be tried. For cosmetic reasons and when the growths are too large, chiseling away the excess of bone relieves the deformity, which is not liable to recur.

Osteogenesis imperfecta—Fragilitas ossium

Definition.—A condition of the bones characterized by fragility, with frequent fractures—often multiple.

Etiology.—About 15 per cent of the cases show an hereditary tendency. The disease is congenital, fractures occurring during intra-uterine life and up to three years of age.

Treatment.—As the cause of this disease is not known there is no specific therapeutic indication. Internal gland preparations with iodid of potassium should be tried. Care should be taken when the condition is discovered not to cause any more fractures by rough handling, and to treat the factors already existing. Children, so afflicted, usually die young; some survive.

Osteitis deformans

(*Paget's Disease*)

Definition.—A chronic disease of the axial bones of the body characterized by the co-existence of atrophy and hypertrophy with deformity. It occurs, usually, during middle age.

Etiology.—This is very obscure. Paget considered it a chronic inflammation. Among the alleged causes are syphilis, constitutional disturbances, organic nerve disturbances. Arteriosclerosis almost always accompanies the disease.

Treatment.—No treatment has been of any avail, it is therefore symptomatic. Internal secretion preparations and iodid of potassium may be tried.

Osteomalacia

Definition.—A disease of adult life characterized by a marked softening of the bones, affecting mostly women of the poor, who have had frequent consecutive pregnancies.

Fig. 149.—Puerperal Osteomalacia. (After Strümpell, "Text-book of Medicine.")

Etiology.—Inheritance seems not to play a part, although children of women affected often show signs of rickets. No definite etiological factor has as yet been discovered. Toxemia and faulty internal secretions have been suspected.

Treatment.—No satisfactory treatment has as yet been established. Internal secretion preparations in combination with iodotropon may be tried.

Bossi introduced *adrenalin* with apparent success in several cases, and recently C. Merletti [1] has reported the history of a florid case cured by this remedy. He injected one c.c. of a 1 to 1,000 solution subcutaneously, once a day for twenty days, after which the patient was again able to walk. After an interval of ten days the patient was injected for another twenty days, when she was considered cured.

Fehling thought that the disease was due to a disturbed function of the ovaries because it occurred at a period when they were especially active, and he therefore advised castration. C. Everke [2] reported good results in some cases in this method of treatment.

The diet should be generous and nutritious. The phosphates and the hypophosphites with cod-liver oil will supply the lack of salts in the system. Improvement in the general hygiene will be secured through the avoidance of wet and cold. Women should be warned against frequent pregnancies where heredity seems to play a part. Oöphorectomy has been done, followed by improvement in some cases. Wherever possible suitable, well-fitted braces should be employed to prevent greater deformity taking place.

[1] *Klinischtherapeutische Wochenschrift,* Oct. 21, 1907.

[2] *Monatsschrift für Geburtshilfe und Gynäkologie,* August, 1908.

Osteomyelitis

Definition.—An acute suppuration of the bone due to infection of the bone marrow by pyogenic organisms.

Osteomyelitis exists in an acute and in a chronic form. Local swelling, fever, and pain are the pronounced symptoms.

Etiology.—The direct cause is always an infection by some pyogenic organism; hence the term *acute infectious osteomyelitis.* The Staphylococcus pyogenes aureus is the most frequent offender, occasionally it is the streptococcus. Other causes are the pneumococcus and the typhoid bacillus. In long standing cases with open sinuses, other pathogenic and saprophytic organisms may be present.

Prophylaxis.—Prophylaxis here implies hygienic living and the prevention of infection.

Treatment.—As the treatment of this condition is entirely surgical, the reader is referred to works on surgery for the detailed treatment. It may be said here, however, that as soon as a positive diagnosis of osteomyelitis has been made, operation should provide thorough drainage by sufficient trephining of the bone.

Care should be observed, especially in young growing children, not to interfere with the epiphyseal line, and if the infection has extended into the joint, the latter should be opened and drained as in suppuration of any joint.

As to the time for removing a sequestrum, resection of the bone, and bone grafting, this is a purely surgical matter.

Epiphysitis

Definition.—An acute inflammation of the epiphyseal end of a bone, usually occurring in children and often resulting in permanent deformity. Hemorrhage into the epiphysis region, as in scurvy, may result in detachment of the epiphysis.

Treatment.—Antiscorbutic and antisyphilitic management give good results in that class of cases.

The treatment in all stages of simple acute epiphysitis is the same as in acute osteomyelitis. The treatment of the resultant deformity lies in the domain of orthopedics rather than in general surgery. When the disease has affected one of two parallel bones, it may become necessary to destroy the epiphyseal end of the healthy bone to prevent deflection deformity. Vitamine therapy in the shape of autolyzed brewers' yeast may be tried. (*See* Section i.)

Unclassified Disturbances of Locomotor Organs

Club Foot

(*Congenital Talipes equino varus*)

Definition.—Club foot is a deformity characterized by inversion of the sole, elevation of the heel and a torsion and adduction of the front part of the foot.

Etiology.—The cause of congenital club foot has never been satisfactorily explained. It frequently is associated with other congenital deformities. Heredity probably is a factor.

FIG. 150.—CONGENITAL CLUB FOOT. (After Campbell and Kerr, "Surgical Diseases of Children.")

Varieties.—Two forms may be recognized: one associated with some malformation of the bones of the foot—such as absence of the scaphoid, fusion of several tarsal bones, defect in the tibia, etc.; the second, in which no such defects are present.

Treatment.—The earlier in life treatment is begun the better the prognosis as a general rule. Plaster of Paris dressings applied over several layers of flannel, after the foot has been manipulated and stretched, gives the best results.

The foot should be grasped by the heel, the forepart of the foot held between the thumb and first finger of the free hand and the foot forced into abduction, eversion, and dorsal flexion. When sufficiently pliable, the plaster of Paris bandage is applied and the overcorrection maintained for three weeks. At this time a new plaster bandage is applied, improving the position of the foot each time the plaster is changed. This overcorrection may, however, be much more quickly attained by decreasing the interval between the change of plaster.

As it is necessary to maintain overcorrection for a long period—sometimes for four years—some form of retention apparatus must be applied. The night brace which is applied at night, or a retention brace

worn in the shoe, is better than any apparatus attached to the outside of the regular shoe, for the reason that the regular shoe upon becoming wet loses its shape and assumes the shape of the deformed foot. Wearing a Thomas sole which raises the outer side of the shoe one-quarter of an inch or higher is advisable toward the end of the treatment, when the child is walking. Forcible correction under ether anesthesia, a few times in the beginning of the treatment, hastens the correction of the deformity.

At times in very resistant cases it is necessary to lengthen the tendo Achilles in order to allow the heel to come down. The plantar fascia may have to be likewise cut to allow sufficient abduction to be made. The astragaloscaphoid ligament frequently also has to be cut when it interferes with abduction.

Forcible manipulation with a Thomas wrench is often resorted to in the older and resistant cases. Lately, wedge-shaped pieces of bone have been inserted into the split scaphoid bone with apparently good results. The method is said to insure against relapses.

FIG. 151.—FLAT FOOT. (After Campbell and Kerr, "Surgical Diseases of Children.")

Flat Foot

Definition.—A foot in which the normal hollow of the arch is obliterated.

Etiology.—Relaxation of the plantar ligaments, weak musculature, deformity of the bones entering into the structure of the arch of the foot, are frequent causes.

Varieties.—Two varieties of flat foot may be recognized: the rigid type, in which the bones of the foot seem to flex as a unit at the ankle joint; and the flexible type, in which the arch is obliterated only on weight bearing.

Treatment.—The rigid flat foot should be manipulated and the arch restored as far as possible while the patient is under an anesthetic. The foot should then be encased in a plaster of Paris dressing extending to the tuberosity of the tibia, the foot being held in marked inversion and dorsal flexion. The plaster dressing should remain three weeks, after which a properly fitted metal plate or arch support made from a casting of the foot should be worn.

Mechanotherapy is beginning to play a rôle in the treatment of this condition. The Zander machines for flexion and extension, inversion and

eversion, and a rotary action, have been designated to loosen the adhesions between the bones, and to strengthen weakened muscles.

Operative procedures, such as removing a wedge-shaped piece of bone base downward and inward from the neighborhood of the head of the astragalus, have been employed; osteotomy of the front of the os calcis and neck of the astragalus have also been done. Bone grafts have also been lately employed with success.

In treating the flexible flat foot, massage and strapping with two-inch adhesive plaster followed by a suitable plate usually give relief. In strapping a foot the plaster strips should be applied from the outer side of the foot beginning under the external malleolus carried under the sole at the junction of the back and middle third of the foot and up the inner side of the leg, or crossing over in front of the tibia to the outer side of the leg. Two such strips suffice with one cross strip at the level of the internal malleolus. At intervals one-inch strips cross the upright strips to prevent their slipping. The strapping should be renewed at least every four or five days until the arch is built up, when the metal plate may be substituted.

Ankle Sprain

Definition.—An injury to the soft parts about the ankle joint involving either the synovial membrane, the ligaments, the tendons or the superficial tissues.

Etiology.—This is usually caused by some form of traumatism.

Treatment.—

Acute Form.—The treatment consists of rest by splinting with a plaster of Paris bandage for about one week, then strapping with zinc oxid adhesive plaster. This should be followed by a course of treatment consisting of light hand massage for fifteen minutes daily. Hot air baking once daily for thirty to forty-five minutes at 200° to 250° F. or hot daily fomentations followed by a cold douche when the effusion has disappeared are of value. Massage at the outset is painful, but if properly done shortens the course of the treatment and hastens convalescence.

Chronic Form.—Daily hot-air treatment, as above, followed by hand massage of the joint and muscles acting around it gives good results in the majority of cases. Restricting movements by means of strapping with adhesive plaster or silk elastic bandages relieves the pain when walking is resumed. When the "sprain" is due to malposition of the foot, such as is caused by flat foot, this must be corrected as must any other malposition. When the sprain is of static origin the wearing of a low-heel common-sense shoe should be enjoined.

Podalgia

Podalgia is a term used to indicate pain in the feet, of whatever origin. Pains in the feet occur in flat foot, gout, rheumatism, syphilis, tabes, chronic alcoholism, diabetes, etc.

Plantar Neuralgia.—Plantar neuralgia is a neuritis limited to the plantar nerve.

Morton's Neuralgia.—Morton's neuralgia is a name given to pain located in the metatarsophalangeal joint of the third and fourth toes.

Tarsalgia.—Tarsalgia is a neuralgia probably due to incipient flattening of the foot.

TREATMENT.—We should seek to eliminate the underlying cause, build up the general health by exercise and cold sponge baths and treat the pain symptomatically.

It is well to begin treatment by giving the initial dose mentioned under Muscular Rheumatism and follow it up by salicylates and nervines. Hot foot baths twice a day are serviceable. Massage, vibration, the thermopenetration, and baking in hot air are well-directed procedures. Low-heel shoes should be worn.

FIG. 152.—ABDOMINAL SUPPORT.

Chronic Back Ache

Back ache is a very common symptom to which both sexes are heir. Some conditions which give rise to this symptom are common to both, while others are peculiar to one or to the other.

Occurring in both we find pendulous abdomen, lumbago, muscular rheumatism, Pott's disease, renal calculus, tumors of the kidney, etc., vesical calculus, cystitis, neurotic spine, static conditions and arthritis of the spine—especially of the sacro-iliac region.

Occurring in man especially we have prostatic and testicular affections and overstrains; also hemorrhoids.

In constipated women. during the child-bearing period, this is a common and frequent symptom, relieved, however, by a suitable binder or properly fitting maternity corset. Relief from this symptom, when due to gynecological conditions, is not always obtained, as frequently, when a gynecological condition has been relieved, the back ache still remains.

Among the diseases giving rise to this symptom are pelvic inflammation, uterine disease, ovarian and tubal affections and uterine displacements, floating kidney, etc.

Static Conditions as a Cause of Back Ache.—Primarily static conditions are those which cause a forward displacement of the center of gravity which induces an increased effort on the part of the muscles of the back to retain the normal balance. Among the factors which bring about this condition are high-heeled shoes, pronated flat feet with short gastrocnemius muscles — the so-called muscle-bound foot; general enteroptosis or visceroptosis; pelvic conditions in women, such as an anteflexed uterus, causing dysmenorrhea; asymmetry of the body—especially an inequality in the length of the legs—occurring in infantile paralysis, hip disease, club foot, etc. Sacroiliac strain, sacroiliac subluxation and arthritis are a frequent cause of back ache.

Fig. 153.—Uplift Corset; Back View. (Munson.)

Pain and other pressure symptoms may be due to an *enlarged transverse process of the fifth lumbar vertebra.* Such irritation may set up hyperplasia and erosion in soft tissues and in bone.

Treatment.—The first thing to be done is to make inquiry regarding occupational overstrain and regularity of bowel action, and also to examine the urine for albumin, sugar, and bile. Following this a local examination should be made with the object of arriving at a diagnosis by exclusion.

In very many cases visceroptosis plus constipation will be elicited, whereupon a well-fitting *abdominal supporting belt or binder* may be ordered and the *initial dose* recommended under Muscular Rheumatism may be prescribed. If the patient can come to the physician's office every

second or third day, vibratory massage may be applied, or he may be told to wear a large wet compress covered by dry flannel over the seat of pain *in bed over night* (neptune's girdle).

To secure regular bowel action a lapactic pill may be taken at bed time. Corpulent people should reduce their weight by a system of diet and physical exercise or massage.

For sacro-iliac strain or sacro-iliac disease many means have been tried, ranging from a simple strap around the pelvis to various therapeutic corsets, braces, and plaster of Paris jackets.

A properly adjusted abdominal binder or supporting and uplifting corset should be given a good trial before operative procedures for enteroptosis or uterine displacements are even thought of. Disease conditions which demand surgical help should have it without much delay.

Section XII

Neurological Memoranda—Prophylaxis and Treatment of Nervous Ailments

(*See also Section V*)

General Considerations

The nervous system stands at the head of psychic and bodily phenomena. When the entire nervous system is disturbed there are *general symptoms;* when the integrity of individual nerves is disturbed we have *localized symptoms,* as shown in the various motor, sensory, secretory, reflex, trophic, electrical and circulatory phenomena. The pathology of the central nervous system embraces malformations, injuries, compression and circulatory disturbances (anemia, hyperemia, hemorrhage, embolism and thrombosis), infection, acute and chronic inflammation, softening, sclerosis, syphilis, tuberculosis, carcinosis, parasitic invasion, cavity formation, and anomalies of internal secretion, etc. The lesions may be unilateral, bilateral or in disseminated plaques.

The nervous system is composed of two great systems of neurons—the *afferent sensory* and *efferent* (motor) and their various connections. The white matter of the central nervous system carries or transmits impulses. The gray matter receives and transmits impulses, and may store potential energy to transmit impulses. The gray matter of the basal ganglia is the center for automatic action. The gray matter of the spinal or medullary center is the seat of reflex action. Each lower system is under constant control from above. A *neurosis* is a functional derangement of the nervous system, exclusive of mental derangement, which is called "psychosis." *Neuritis* means nerve inflammation. *Neuralgia* means nerve pain.

Brain and cord are surrounded by cerebrospinal fluid under positive pressure and containing little albumin. When pressure and tension increase by reason of inflammatory processes, tumors, etc., the choked disk of the optic nerve, ranks first in diagnostic importance. When pressure increases to the extent of compression of blood vessels, we observe *symp-*

toms of direct pressure (vomiting, slow pulse and slow respiration, convulsions, coma).

Motor Phenomena.—Complete motor inability is called paralysis, incomplete paresis. We speak of *ataxia, incoördination, athetosis, tremors, choreic movements,* when there is an uncertainty of movements.

Cerebral paralysis brings in its train rigidity and spasticity of muscles, but no wasting or atrophy, as a rule. *Spinal paralysis* shows flaccidity and wasting.

Paralysis due to disease of the nerves in their course of distribution may be traumatic or toxic and infectious.

Paralysis of the muscles may be due to change in the muscles themselves, as in pseudohypertrophic muscular palsy.

Convulsions are tonic (continuous)—as in tetanus, or clonic—as in epilepsy.

Sensory Phenomena.—Irritative lesions in the sensory tract result in pain, hyperesthesia, paresthesia. Destructive lesions in the sensory tract result in anesthesia, analgesia, distorted temperature sense, loss of muscle sense, disturbances of localization and secretion. Special sense symptoms and phenomena are observed in connection with the special senses.

Reflex Disturbances.—Disturbances of reflex action present complicated conditions and even in health there is a great difference in the intensity of reflex phenomena which are distinguished as skin reflexes, deep reflexes, tendons and muscles, visceral reflexes (rectal, bladder, genitalia, organic reflexes [respiration]). The absence of cutaneous reflexes is not of much clinical significance. Examples of reflex activity are: sneezing, winking, coughing, flow of saliva or gastric juice, vomiting, blushing. Without these life would cease.

Trophic Disturbances.—Trophic disturbances in the various tissues are usually the result of faulty circulation or faulty innervation. Trophic vasomotor disturbances in the skin are the causes of urticaria, erythema, bed sores, etc. Other vasomotor disturbances are pallor, coolness, congestion and edema of the skin.

Aphasia.—We distinguish *motor* or *ataxic* aphasia, sensory word-deafness, amnesic aphasia (failure to recall words, etc.), in conjunction with disorders of speech, difficulty in reading (alexia), writing (agraphia), and communication by gesture (animia) may occur. Aphasia without motor paralysis occurs with small circumscribed lesions or may be transitory in consequence of circulatory disturbances. Aphasic disturbances may be improved by attempts at speech, exercise, etc.

Emotional Disturbances.—In the emotional sphere we observe changes of habitual temper, such as irritability of temper, mental depression, and mental excitation.

The disorders of intellection embrace dullness, confusion, loss of memory.

The characteristics of the insanities are: delusion, an abused or unformed belief; illusions, false interpretation of objects; hallucinations, a sense of perception without a physical basis.

Delirium is characterized by restlessness or incoherence of speech, with illusions and hallucinations. It may be active or wild, as in delirium tremens, low or muttering, as in "typhoid" states. The onset may be sudden or slow. In the beginning of an acute infection it is the expression of profound toxemia, and as a terminal phenomenon it may express brain inanition from circulatory failure.

Insomnia—Sleeplessness—Coma.—Patients complain of disturbed sleep, persistent wakefulness, sudden twitching or jerking of the body at the time of falling asleep, etc.

Disturbed sleep has slight diagnostic value, because of its occurrence in slight as well as serious ailments in neurotic persons and from mental or physical fatigue or indulgence in tea, coffee, tobacco, etc.

Disturbances of consciousness, according to their degree or severity, are termed somnolence or lethargy, stupor or coma.

In *coma* there is the condition of insensibility from which we cannot arouse the patient.

The Sympathetic System.—This system has largely for its office the control of the blood supply in the various organs and parts of the body. Indirectly it probably is concerned in the secretion of sweat and the function of various glands. In particular the cervical sympathetic controls the dilatation of the pupil; it supplies motor fibers to the unstriped muscular fibers of the orbit; it controls the action of the salivary glands and sweat glands of the face and neck; it also sends vasomotor branches to the ear, the side of the face, the conjunctiva, the eye, throat, brain and its membranes. In the thorax the sympathetic nerves supply accelerator fibers to the heart. The great splanchnic nerve takes its origin from the sympathetic system. In the abdomen and pelvis it is associated with the motor and vasomotor supply of the large intestine, bladder, uterus, vas deferens and vesiculae seminales. The branches of the sympathetic are very numerous in the suprarenal capsules, having connection with the renal and solar plexuses.

General Plan of Prophylaxis and Treatment

In a broad sense the integrity of the central nervous system depends largely upon a good circulation, provided the blood contains normal ingredients; and insofar as a normal blood supply can be maintained, insofar are we able to ward off nervous disturbances. Not alone can we ward off disease of the central nervous system by keeping the circulating fluids normal, but we can use our intellect to keep the carriers of the blood—the blood vessels—in a normal condition, and thereby prevent

leakage and structural damage to nerve tissue from traumatism due to hemorrhage. Acute infections of the central nervous system due to direct contact or to transmission by insects (fever) may be avoided by isolation, segregation, and screening the homes and veranda.

The ravages of syphilis throughout the central nervous system can be avoided by prophylactic measures and timely treatment. Proper and timely attention to inflammatory processes in the neighborhood of the meninges (nose and ear) may prevent extension to these membranes.

Nature directs attention to the seat of direct or reflex irritation by pain and discomfort, and when a source of irritation is not clear, the reflex neurosis is not usually due to peripheral irritation, but to defect of a higher control from impaired nutrition or anomalies of internal secretion. Thus an increased nutrition of the entire system may counteract cortical exhaustion, and cure, for instance, womb strain or eye strain, for which much unnecessary surgical interference is offered and accepted.

The same reasoning is applicable to convulsive seizure supposed to be due to phimosis for which the probable underlying cause is usually a weak, nervous system.

Remedial Agents

The remedial agents involved in the management of functional or organic disease of the nervous system may be summed up as follows:

Rest of body and mind. Psychic treatment, especially in functional neuroses.

Change of environment.

Adjustment of diet and habits (sex life).

Judicious exercises and occupation.

Hydrotherapy.

Electrotherapy.

Radium

Administration of drugs, sera, vaccines, internal secretions.

Removal of reflex irritation.

Removal of cerebrospinal fluid for relief of pressure symptoms and of delirium.

Injection of specific agents into cerebrospinal canal or directly into the circulation.

Surgical interference to secure decompression. Nerve anastomosis.

Evacuation of cysts and abscesses.

Removal of tumors, etc.

Psychic Equilibrium and Avoidance of Overstrain

The maintenance of psychic balance and the induction of a healthy optimism are helpful factors, as regards the nutrition and function of all body systems.

The nervous system, being at the bottom of all functional impulses, virtually controls every vital organ and may so inhibit or prevent its healthful action as to eventually bring about actual organic disease. First in order comes perverted nutrition, next congestive and inflammatory changes, and then tissue degeneration.

Much more so is this in evidence when one or more of the organs is ailing at the time. It is admitted, for instance, that most persons have their weak physical points. With one it may be the heart, with another the kidneys, the lungs, brain, or liver. It is these crippled organs that bear the first strain, but over all the purely mental perturbation is dominant.

Prevention of nervous and mental disorders incident to school life is a practical possibility. Children under ten years of age should not attend school if country life and teaching at home are possible. Overstudy and competition in ambitious children should be avoided.

Bad news is usually withheld from the sick one, in fear of ultimately disastrous results. Overstrain of nerve, mind, and of physical strength, mental depression, disappointment and worry will work havoc to the finest constitution, and this truism can be applied to all, in every walk of life, in every kind of work! Alas, each one believes he can stand the shock better than his fellow.

No one can get well who believes himself to be sick—and therein lies the curative value of mental healing or suggestion. Life itself with its burdens and inevitable time limitation is in many respects like a chronic ailment. To live on optimism may mean the tranquil acceptance of a curtailed or handicapped efficiency. To allow pessimism to permeate the soul of the clamorer for help is not the attitude of the true physician. Both pessimist and optimist will soon enough draw oblivion in the great lottery of the universe, for, "yesterday is but a dream, and tomorrow is only a vision, but today, well lived, makes every yesterday a dream of happiness and every tomorrow a vision of hope." [1]

Electricity for the General Practitioner

Electrical power may be compared to water power. The force which starts the column of water flowing is gravity, that of electricity is electromotive force. Electricity flows from a high potential (the positive pole) to a low potential (the negative pole). The zero point is the earth, and the potential is the capacity to do work. The unit of measurement of electromotive force is the *volt.*

Substances through which electricity flows are *conductors* in contradistinction to *non-conductors,* or *insulators.*

The unit of resistance to the electrical current is the *ohm.*

[1] From the Sanskrit.

Ohm's Law.—The current strength is equal to the electromotive force divided by the resistance.

The current strength is measured and expressed in ampères. For therapeutical purposes, we gauge the current strength in milliampères (1/1000 of an ampère).

The forms of electricity principally used are the constant current (galvanic current), the interrupted current (faradic current), static electricity (Franklinism), the sinusoidal current, and the d'Arsonval, or high frequency current.

The galvanic current is produced by chemical action. The faradic current is produced by induction in a secondary coil surrounding a primary coil in activity, with frequent interruptions. Static electricity is produced by friction and confined by insulation.

Action of the Electric Current upon Living Tissues

Electrolysis is a chemical decomposition of tissues at the electrodes—a process taken advantage of for the destruction of nevi, small tumors, etc.

Cataphoresis is the power of carrying solutions through the tissues in the direction of the current. Cocain and other drugs may thus be introduced into the body.

Electrotonus is a modification of the nerve electricity by means of the electric current. At the anode it is lessened (anelectrotonus); at the cathode it is increased (catelectrotonus). A sudden increase or decrease of the current (voltaic alternative) also causes muscular contractions. The galvanic current possesses all these properties in a more marked degree than the faradic current.

A *degenerating muscle* loses the power of response to *static electricity first,* next to faradic, then to simple opening or closing of the galvanic current, and finally to the voltaic alternative.

Reaction of Degeneration.—1. Loss of muscular contraction to *indirect or nerve stimulation* by the galvanic or faradic current. 2. Loss of muscular contraction to *direct stimulation* by the faradic current. 3. Modification (sluggish contraction) of muscular contraction by stimulation with the galvanic current.

Thus electricity may aid us in forming a prognosis, for a complete reaction of degeneration implies a more grave prognosis than a partial one.

Currents and How to Apply Them

Constant current (galvanic).
Alternating current (faradic).
Static current.
Static wave current.

Static spark and friction current.
Static brush discharge.
Static breeze.
Static vacuum.
Static induced current.
Alternating (faradic induced current).
Sinusoidal current.
High frequency current.
Autocondensation or indirect d'Arsonval current.
Diathermy or thermopenetration.
Oudin current.

Galvanic Current.—The galvanic current is best adapted for the regeneration of nerves. The electrodes should be applied directly over the nerve for about ten minutes. To exercise the muscles one sponge is placed over the nerve trunk and the other over the muscle — making and breaking the current at the latter pole.

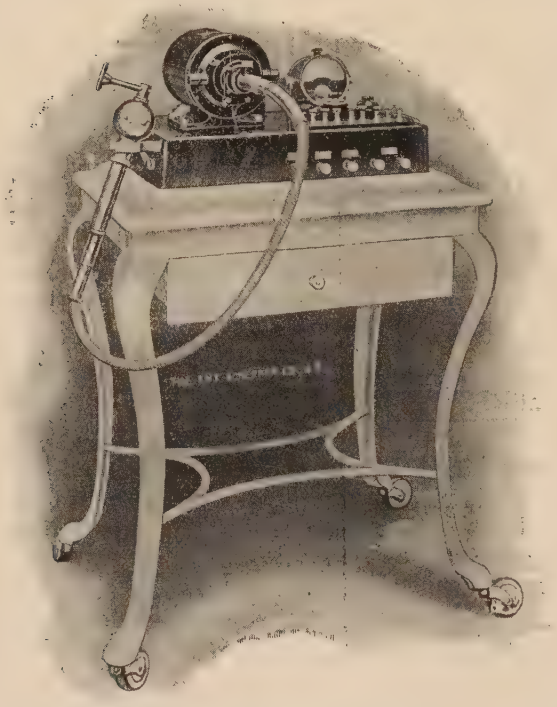


FIG. 154.—APPARATUS FOR GALVANIC AND FARADIC CURRENT WITH VIBRATOR.

The galvanic current is also employed as a general tonic and in about the same way as the faradic current. To influence the nutrition of degenerated muscles, the anode is placed over the supply nerve and the cathode is rubbed over the muscle without breaking the current. To produce muscular contractions, the cathode is placed over the motor point and the circuit is alternately opened and closed at this point.

In cataphoresis for neuralgia the anode is saturated with a 10 per cent cocain solution.

For *electrolysis* the constant current may be employed, one pole of which is a needle.

Faradic Current.—The faradic current is adapted for the reëstablish-

ment of the conduction of impulses and for the purpose of inducing muscular contractions.

The faradic current is employed for general tonic purposes in central paralyses, as well as in peripheral paralyses when the muscle is but slightly degenerated. In applying the rapidly interrupted current, one electrode is placed over the nerve supplying the muscle and the paralyzed part stroked with the other electrode. This method does not necessitate an exact knowledge of the position of the motor points, a motor point being a certain spot in each muscle at which the action of the current is more irritating. One application each day or every other day is sufficient.

Static Current.—The current from the static machine, with the spark balls approximated, is a constant current—it is negligible in its effect; but when they are separated the current becomes interrupted, the sparks passing from pole to pole. The static current is capable of being applied in various ways. Static electricity is used for tonic effects by drawing sparks from various parts of the body.

The Static Wave Current.—With the patient on the insulated platform and connected to the positive pole by electrode and wire, the wave current is productive of profound physiological effects. When interrupted not more than 600 times per minute it produces tissue drainage by rhythmically contracting muscles and cells.

Plates of tin foil or sheet metal (lead) up to 6 x 10 inches and vacuum tubes serve as electrodes for the body surface, while for the cavities, rectum or vagina, there are special designs of metal or glass. A ground chain is attached to the negative pole.

When applying the static wave current in stiffness of joints or muscles, the muscular spasm will be relieved by the excitation of rhythmical contraction and relaxation of the muscles involved, whereby the infiltration is expressed.

The Static Spark and Friction Current.—This is particularly useful for inducing muscular contractions, and for elimination of exudates. With the spark-gap either open or almost closed, the shepherd's crook is made to connect the positive pole with a place on the platform some distance away from the patient's feet. A ground chain is attached to the negative pole. Another ground chain is connected with the electrode —a pear-shaped sparking ball, by which the sparks are made to pass directly to the painful part, or a series of spark discharges is produced by running the electrode over the clothing.

The Static Brush Discharge.—The static brush discharge is indicated as a rubefacient and, where superficial congestion is present, for instance, to soften the induration around chronic ulcers. The poles are widely separated and the positive pole is connected with a ground chain;

and the shepherd's crook is held by the patient and placed in contact with the negative pole. Another ground chain is attached to the brush electrode. A pillow should be placed between the patient's hands and thighs to prevent sparking.

The Static Breeze.—The static breeze is useful in anemia and some types of headache and for psychic effect. The poles are widely separated. The shepherd's crook connects patient or platform with the positive pole and the negative pole is grounded. The point electrode of the stand employed is placed near the part to be treated, or the crown is suspended over the head of the patient.

Fig. 155.—High Frequency Apparatus.

The Static Vacuum Tube Discharge.—This is applied with a glass vacuum tube. The poles are slightly separated and the vacuum tube is connected with the positive pole, except for an infected condition—for which the more actinic negative pole is indicated. A ground chain is attached to the other pole.

The Static Induced Current.—A static induced current is produced by connecting two Leyden jars to the two poles. The current then becomes an alternating current of more or less moderate strength and may be used for light x-ray work.

Alternating Current.—*Induced current* is another name for the "faradic" alternating current. Slight tissue drainage is obtained from faradic coils when set at a slow rate of interruption.

Sinusoidal Current.—Sinusoidal current is produced by special apparatus, or by attachments to universal outfits. Because its effects are somewhat similar to the static wave current, the sinusoidal apparatus can be used at times in place of the more costly and very cumbersome static machine. It produces powerful rhythmical tissue contraction which is useful for tissue drainage, etc.

The High Frequency Current.—This is produced by high frequency apparatus. It is an alternating current of such high rate of oscillation that no tissue contraction is perceptible. It is very useful for thermic

and mechanical effects and is becoming widely employed by the well-equipped physician. It has no electrolytic action.

Autocondensation or Indirect d'Arsonval Current.—The method consists in connecting the patient with one pole of the high frequency apparatus and placing him on an insulated cushion or pad, which is connected with the other pole. Very soon a sense of quiet restfulness and a gentle warmth extending over the entire body is felt. This is accompanied by a slight flushing of the capillaries and an inclination to drowsiness, so that patients frequently fall asleep during the treatment.

Autocondensation helps to equalize the circulation and is a valuable aid in reducing blood pressure and in the treatment of angina pectoris and arteriosclerosis. Besides, the autocondensation method brings about general increase of metabolism, increased activity of the glands, and greater respiratory excursions.

To obtain thermic effects in acute infectious inflammatory conditions or for stimulating metabolism, the d'Arsonval current promises the best results because of the active hyperemia produced by it. When it is desired to obtain persistent hyperemia, for instance, in low grade tuberculous inflammations, it will often be found efficacious to use radiant light and heat and the x-rays, in combination with the d'Arsonval current.

Diathermy, or Thermopenetration.—This is the name given to a method of using the *direct d'Arsonval current,* which promises to become a very useful and effective electrical modality. The patient is connected directly with the apparatus by two electrodes of glass or soft metal (tinfoil). The effect is one of purely mechanical heat production of greater or lesser extent in the path of the passage of the current. There is no electrolytic action and no sensation except that of warmth. Greatly increased circulation, amounting to several degrees Fahrenheit, occurs in the intervening tissues.

The wide range of usefulness of this current is apparent.

The functional activity of the stomach, liver, pancreas and kidneys may be readily and freely increased. By application over the thorax, respiration will be deepened, and in asthma expectoration becomes freer and less tenacious. In cardiac disease, after digitalis failed to produce the desired effect, the heart has been made to respond, with simultaneous production of profuse diuresis.

In gonorrheal arthritis, by heating the joint to 41° C., pain and swelling will be relieved. In gout and rheumatism similar results will be noted. Also in rheumatoid arthritis.

The production of arterial hyperemia of long duration and the relief of venous stasis may be utilized in many conditions where improved nutrition brings about relief or cure—for instance, in old ulcers or in diabetic ulcers, in intestinal toxemia, colitis, cervical adenitis, tuberculosis

of the joints or lungs; indeed the circulation may be increased to such an extent in this condition that hemorrhage results in some cases.

The technic has to be adapted to the case. The principle is to firmly apply larger or smaller electrodes of the same or different sizes to opposite sides of the region to be treated, and to pass a current up to several hundred or thousand milliampères—according to the size of the plates—for ten to thirty minutes daily, or every second or third day.

The current can be localized by applying plate electrodes of different sizes, the current condensing towards the smaller sized one.

The Oudin Current.—The Oudin current may be obtained from the resonator of the high frequency apparatus or from a Ruhmkorff coil. It produces an oscillatory current, and when used in connection with glass vacuum electrodes it affects stimulation of metabolism and promotes absorption of exudates.

This current is also used for removing warts, epitheliomata, nevi, small hemorrhoids, and for intravesical work. The tissues are destroyed by the coagulation of albumin.

For non-infectious, inflammatory conditions, however, the currents producing chiefly mechanical effects are superior to the d'Arsonval because they effect tissue drainage by relieving stasis and induration through the rhythmical contraction and relaxation of the tissues.

The electrolytic action of the electric currents is desirable chiefly for the removal of warts, nevi, small hemorrhoids, enlarged tonsils, etc.

Apparatus for the General Practitioner

The apparatus which the general practitioner will use in his office will vary according to his needs, from the small portable battery and coil to a wall plate, static machine, high frequency apparatus, or transformer which also produces x-rays.

Therapeutic Indications for the Use of Electricity in Conjunction with Hygienic, Medicinal and Surgical Therapy

A better knowledge of the effects of electricity has led to its application in diseases which formerly were never thought of as being amenable to treatment by electricity.

If one keeps in mind that their physical effects are mechanical, thermic and electrolytic in nature and knows by which currents they are best produced, even the beginner will have little difficulty in deciding which current to use in treating different cases.

Tuberculous Affections.—In the treatment of *tuberculous affections* by electricity it has been found best to combine with it the use of the x-ray and radiant light and heat. The x-rays should be employed for ten minutes at a time, followed by radiant light and heat and the application

of the direct d'Arsonval current with tinfoil electrodes applied to opposite surfaces over the affected area—using 500 to 1,000 milliampères for an hour once or twice daily, or once every second day.

This combined method gives the best results, but even the direct d'Arsonval alone produces a profound hyperemia, giving the blood free access to the seat of infection.

It should never, however, be forgotten that everything possible must be done to tone up and strengthen the patient's general constitution by good, nourishing food, fresh air, and appropriate medication.

Pulmonary Tuberculosis.—The x-rays are usually applied anteriorly and posteriorly, and followed, if dermatitis sets in, by the daily use of radiant light and heat and the direct d'Arsonval current with two electrodes over the affected area.

Tuberculous Adenitis.—Early cases of this troublesome condition yield nicely to the daily employment of radiant light and heat and the direct d'Arsonval current.

The x-ray has given very good results too, but has by some been abandoned in early cases in favor of the above method alone, because of the danger of disfigurement after several series of x-ray exposures.

For advanced cases before the formation of pus, one series of x-ray exposures has been advocated and thereupon daily use of radiant light and heat and the direct d'Arsonval current. When the condition of the patient warrants the assumption that the infectious process has come to a standstill the static wave current or the vacuum tube may be used for the removal of the infiltration.

Tuberculosis of the Kidney, Bladder and Prostate Gland and Tuberculous Arthritis.—These conditions are treated on the same general principles.

The x-ray is used over the affected part and subsequently we apply radiant light and heat and the direct d'Arsonval current. To increase the effect of the latter, one smaller sized electrode is brought into as close a contact with the affected part as possible, and another large electrode is placed on the opposite side of the body.

Pyelonephritis — Parenchymatous Nephritis — Tuberculous Peritonitis.—The same treatment has been recommended for pyelonephritis and parenchymatous nephritis and has been successfully employed for tuberculous peritonitis.

Lupus.—In lupus the treatment with the x-ray and the high frequency current or x-ray and the static brush discharge has been found by some to be superior to the Finsen light method, and in many cases the skin has returned to its normal appearance. The new Kronmayer lamp has recently been recommended.

Septic Processes.—Septic processes over limited areas may be treated substantially on the same general lines as the tuberculous affections, the

rent is applied with the balls as widely separated as the patient will stand.

Diabetes mellitus—Parenchymatous and Interstitial Nephritis—Constipation.—All of these conditions may be treated by means of the static wire current.

Angina pectoris—Hardening of Arteries.—In angina pectoris and hardening of the arteries with increased blood pressure, the latter can be brought down from ten to twenty millimeters at each sitting by daily treatment with the indirect d'Arsonval current or autocondensation method. The patient is seated on a specially constructed pad or chair, or is placed on a non-conduction cushion; under this is put a sheet of metal to which one terminal of the d'Arsonval current is attached. The other terminal is held by the patient. The treatment is continued for about twelve minutes with from four hundred to six hundred milliampères. The treatment is especially effective when habits and diet are regulated (*see* Auto-intoxication), except in the most advanced cases. In the early stages it helps in preventing the rapid progress of the trouble.

Spinal Cord Diseases.—Tabes dorsalis—Poliomyelitis.—Spinal cord diseases, such as tabes dorsalis, and poliomyelitis, in the earlier stages, may be much relieved by the static wave current, applied by means of a long, narrow metal electrode placed over the spine and with the terminal balls widely separated. Sparks and friction sparks may be applied over anesthetic areas.

Chorea.—In chorea, in order to avoid the disturbing noise from the sparks, the patient is placed on his back with the metal electrode next to his spine and the sliding rods are widely separated. This, with regulation of diet, exercise, and fresh air, will relieve many early cases.

The Nerve Clinic

Classification of Nervous Derangements

In the present state of our knowledge there is no stability in medical classification, and this is particularly true as regards nervous derangements. The classification adopted under the title, Nerve Clinic, may not appeal to the neurologist, but may meet the demands of the general practitioner, for whom this book is written.

Neuralgias—Painful Tics—Headache—Migraine

Neuralgia—Painful Tics

Neuralgia is a term applied to a nerve irritation characterized by pain along the course of a nerve or nerves, which may be of central or peripheral

origin, and may be idiopathic (primary) or symptomatic (secondary).

Etiology.—The predisposing cause is a neurotic, gouty, or rheumatic constitution. The exciting causes are toxic agents, including autointoxication from the intestine (dyspepsia, constipation), acute and chronic infectious diseases, exposure, overexertion, emotional shock and injury, and direct irritation, as from a carious tooth or tumor. Syphilis, tuberculosis, carcinosis, malaria, diabetes, Bright's disease, tabes, and alcoholism are among the principal underlying causes. Neuralgia may be reflex from the pelvic and other organs, or may be due to derangements of internal secretions, etc. Neurotic individuals frequently complain of neuralgia.

Cervicoöccipital neuralgia (neck pain) is not rare. It is more common in women between the ages of twenty and thirty-five. Neck pains occur in migraine, in hysteria, in neurasthenia, from spinal irritation, as a result of eye strain, as a symptom of brain tumor, meningitis, or rheumatic inflammation of the neck muscles and nerves, as a true neuralgia, and often as a reflex of pelvic disease. As a true neuralgia, the pain is usually unilateral, paroxysmal, sharp, and sometimes intense. One may demonstrate tenderness over the exit of the nerves. The ailment may last for several weeks.

Cervicobrachial neuralgia is a painful condition of the sensory nerves of the neck, shoulder, and arm. It is rather rare, more common in women, and is produced by the usual causes of neuralgia. There may be an accompanying neuritis with burning sensations. Anesthesia, vasomotor disturbances, herpes, muscular weakness, and atrophy may be present.

Digital neuralgia, where the pain occurs in a single finger, is sometimes complained of. It is often due to a local injury or neuritis. As a reflex it may be due to a remote trouble.

Supra-orbital and infra-orbital neuralgia is marked by shooting pains and tenderness along these nerves, by painful spots at the supra-orbital notch, at the inner angle of the orbit, at the junction of the bone and cartilage of the nose, and over the infra-orbital foramen. In protracted cases the hair on the affected side may become gray.

Supramaxillary neuralgia causes pain referred to the teeth of the upper jaw. A painful point may be elicited at the infra-orbital foramen.

Inframaxillary Neuralgia.—The pain is experienced in the teeth of the lower jaw, and painful spots may be found along the auriculotemporal nerve.

Tic douloureux (prosopalgia, Fothergill's neuralgia) is a severe form of *trigeminal neuralgia,* but is to be clearly distinguished from the ordinary form. It is accompanied by distinct changes in the nerve itself. It seldom occurs in people under forty, and is often seen in the very old. The disease is characterized by intense darting pains, usually starting in the upper lip, by the side of the nose, and radiating into the teeth, into

the eye, or over the temple, brow, and head. They occur on only one side of the head. The patient is in great agony during the attack; the face flushes, the eyes water, and the nose runs. After lasting for a few minutes, the pain becomes less, but seldom ceases entirely, and a breath of cold air, speaking, eating, or protruding the tongue may bring on pain. It is worse in winter. Sometimes the spasms come for several months every year, usually in the spring. The face may assume spasmodic movements with the pain. This form of neuralgia differs from ordinary forms because a pathological condition of the nerve is found (neuritis).

Intercostal neuralgia (side pain) is frequently seen in nervous, hysterical and anemic women. In aneurism, caries, and pleurisy there may be pain along the intercostal nerves. Corset pressure, childbearing, pelvic disorders, dyspepsia, heart disease, syphilis, malaria, and lead poisoning are frequent causes. The attack usually comes on suddenly. The pain is sharp and stabbing and but slightly increased with the respiratory movements. There are points of tenderness at the exit of the lateral nerve branches or over the exit of the dorsal or anterior branch. *Pleuritic pain is recognized by not showing any of these tender spots, and by increase of the pain upon breathing.* Herpes zoster may occur with the severe form of intercostal neuralgia. Its course is from two to six weeks, but it may last longer.

Mammary neuralgia (mastodynia) is a form of intercostal neuralgia affecting the anterior and lateral branches of the three or four upper dorsal nerves. It may be a true neuralgia or due to local pressure. Anemia, pendent breasts, poorly fitting corsets, injury, hysteria, sexual precocity, pregnancy, and lactation are causes. It is often severe, and *middle aged women affected with it worry for fear of cancer.*

Lumbo-abdominal neuralgia, pain along the upper branches of the lumbar nerves, occurs oftenest in women, and, in addition to the ordinary causes of neuralgia in this region, there may be straining, constipation, and pelvic disease. We find pain in the loins, back, buttocks, down to the hypogastrium, in the inguinal canal, spermatic cord, testis, scrotum, or labium majus. *Painful thigh,* with pain in front of the knee and anterior and outer parts of the thigh, is a common form.

Coccygodynia affects the lower posterior branches of the sacral nerves. Exposure, injury, and parturition are causes. Reflexly it can *be caused by pelvic disease or spinal irritation.* It s most annoying, as it interferes with walking, sitting, and defecation.

Sciatica, a neuralgia, sometimes a *neuritis,* of the sciatic nerve, is characterized by an intense pain extending down the back of the thigh and sometimes down the leg to the foot.

It is a disease of middle life and it is more frequent in men, being the only form of neuralgia of which this can be said. In addition to the ordinary causes of neuralgia, in this form we recognize as exciting causes

constipation, pressure from hard seats, exposure, muscular strain from heavy work, and pressure due to intraspinal or intrapelvic tumors, etc. We sometimes see it in diabetes, phthisis, alcoholism, and metallic poisoning.

Although the pain may be uniformly distributed along the course of the nerve, not infrequently there are spots where it is more intense. These spots are above the hip joint, near the posterior iliac spine, at the sciatic notch, about the middle of the thigh, behind the knee, below the head of the fibula, behind the external malleolus, and on the back of the foot. Pressure usually elicits tenderness along the course of the nerve. Generally the pain is more or less constant and of a gnawing, burning character, but not infrequently it is paroxysmal, being more intense in damp weather and at night. Walking increases the pain. The patient does not straighten his knee, but walks on his toes to diminish tension on the nerve. In severe cases there may be muscular wasting and fibrillary twitchings.

Diagnosis.—We have to distinguish sciatica from rheumatoid and hysterical hip joint disease, organic diseases of the cauda equina, or spinal cord, muscular pains in the hip and leg, and tumors pressing on the nerve.

Prognosis.—The prognosis must be guarded, as some cases prove intractable to treatment and some last for months.

Podalgia is a term used to indicate pain in the feet, of whatever origin. Pains in the feet occur in flat foot, gout, rheumatism, syphilis, tabes, chronic alcoholism, diabetes, arteriosclerosis and overstrain.

Plantar Neuralgia.—Occasionally in sciatic neuralgia the pain is transferred to the plantar nerve. This condition is probably due to neuritis.

Erythromelalgia is a painful trophic disturbance in the fingers and toes. It is rarely observed in children.

Morton's neuralgia is a name given to the pain in the metatarsophalangeal joint of the third and fourth toes, which is thought to be due to slight dislocation and resulting pressure upon a nerve. The dislocation may come from injury or the pressure of the shoe. However, it may affect other toes, and may not be due to a luxation. Incipient flat foot may cause it, and it has been noticed in pregnancy.

Tarsalgia (policemen's or bakers' disease) is a neuralgia probably due to incipient flattening of the foot and stretching of the plantar ligaments. It has been ascribed to other causes. It is observed in people who have been in the habit of going barefoot and then taking a position where much walking or standing was necessary.

General Principles of Treatment of Neuralgias

We should seek to relieve the underlying cause, build up the general health by exercise and hydrotherapy, and treat the pain symptomatically.

The nervines, analgesics, and occasionally morphin are indicated. In the less urgent cases it is wise to begin treatment with a brisk purge.

Symptomatically, we may give antipyrin, acetanilid, phenacetin, the salicylates, caffein, the bromid of ammonium, or sodium, and sometimes morphin, codein, or hyoscin. Local applications of a 20 per cent solution of menthol, hot cloths, ice bags, blisters, etc., are aids. Chloroform may be injected over the seat of pain (gtt. ii to x).

A combination of the various analgesics sometimes acts better than an individual drug.

The galvanic and faradic currents are often of great help, and—especially the static wave current—when applicable, gives surprising results. The high-frequency current, too, should be given a trial.

When syphilis or malaria are the underlying causes mercury, iodid of potassium, quinia, and arsenic are to be administered, and iron in anemia. Massage and vibratory massage are often useful. In intractable cases surgical procedures are sometimes necessary.

In **pedal neuralgia,** rest, wearing broad soled shoes, and supporting the plantar arch by means of spring soles are indicated. An operation is occasionally necessary.

Treatment of Tic douloureux

Nitroglycerin (gr. 1/100 every two hours) gives relief. Aconitin (gr. 1/200) in repeated doses until the physiological effect is obtained, is probably the best single remedy. Morphin and cocain injections, galvanism, potassium iodid, gelsemium, croton chloral, codein, menthol, etc., are all helpful. Tonics and change of air have helped. Vibratory massage may be tried.

Prompt relief is sometimes obtained if the coal tar derivatives are administered: phenacetin, salophen, or antipyrin (10 to 15 grs.); or acetanilid (5 grs.), preferably with a grain of caffein and 1/100 of strychnin.

Gelsemium, the tincture of fluidextract in ten to fifteen drops every two to three hours, butyl-chloral-hydrate—5 grains every four hours—have given relief from pain.

Heat or the ice bag frequently give considerable relief. The ethyl-chlorid spray or the menthol pencil or a paste of camphor and chloral may be tried, as may a gradually increasing mild galvanic current, with the positive pole over the painful spot, and the negative over the back. Chloroform (mn. ii to x) injected over the seat of pain often gives relief.

In some chronic cases, surgery has been practiced with success by the following method: division with stretching or partial resection of the affected nerve; injections of a few drops of 90 per cent alcohol; excision of the gasserian ganglion when more than one branch is affected.

Treatment of Sciatica

Look for local irritation and the underlying cause, and apply general principles of treatment.

In acute cases of sciatica, one-eighth or one-quarter grain of morphin or cocain, locally by hypo, will give relief; or chloroform (gtt. ii to x) subcutaneously. Occasionally, relief has been secured by the following measures: A spray of ethyl chlorid; hypodermic injections of a two per cent solution of cocain, or a one-tenth per cent solution of atropin in distilled water; or the injection of a five per cent normal saline at 32° F. into the thigh near the nerve trunk. In some cases where the swollen nerve could be distinctly felt, relief has been obtained by evacuation of the serum from the sheath by the insertion of long needles (aseptic) left in about an hour.

Fig. 156.—Deep Injections for Sciatica (Schwalbe).

The SURGICAL TREATMENT OF SCIATICA consists of the stretching—subcutaneous or open—acupuncture, and even excision of part of the nerve. In the subcutaneous stretching, the thigh is forcibly flexed upon the abdomen while the leg is kept in full extension. It is without danger and should be tried in every intractable case.

Headache

Headache (*cephalalgia*) is a broad term as applied to attacks of diffuse pain in different parts of the head and not confined to particular nerves. It is common to observe it in paroxysms, but it may be continuous.

Etiology.—This most common of nervous symptoms is estimated to occur in from 10 to 15 per cent of school children, 25 per cent of men, and 50 per cent or more of women. It may be due to impoverished or disordered blood, such as anemia, etc. We find it in the diathetic states, gout, rheumatism, diabetes, and uremia; and in infections, malarial fevers, etc. Toxic cases arise from lead, alcohol, tobacco, or *gastro-*

intestinal toxemia. Etiological *neuropathic states* are epilepsy, neurasthenia, hysteria, and neuritis. *Reflex conditions* are ocular (eye strain), nasopharyngeal, auditory, dyspeptic, and sexual. *Organic disease* may cause it, such as arteriosclerosis, syphilis, tumors, meningitis, and diseases of the cranial bones and cavities—nasal sinuses.

The various forms are frontal, occipital, parietal, temporal, vertical, and diffuse headaches. We observe pulsating, throbbing headaches, characterizing vasomotor disturbances and usually indicating migraine.

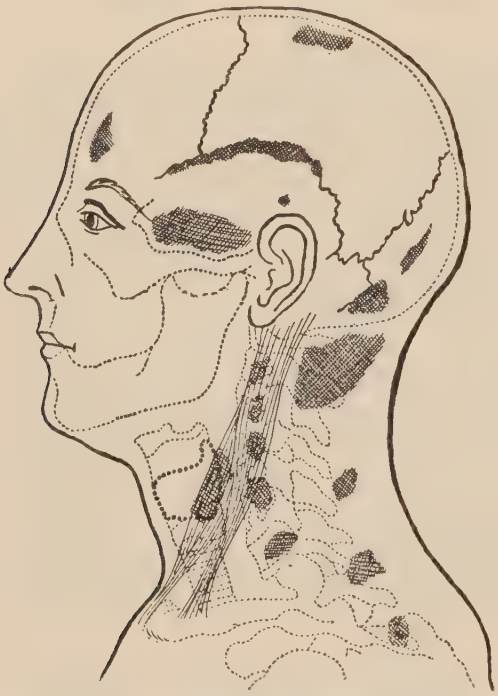


FIG. 157.—INDURATIVE HEADACHES. The most common sites of indurations. (Drawing modified from Edinger by H. S. Yawger, M. D.)

There are dull, heavy headaches which are typical of a toxemia or dyspepsia; constrictive, squeezing, or pressing headache, common in neurotic and neurasthenic patients; and hot, burning, sore sensations, common in rheumatic and anemic cases. The sharp boring pains are seen in hysterical, neurotic, and epileptic cases.

Diagnosis and Differential Points.—It is very important to determine the cause of a headache, and a consideration of the enumerated factors will aid in diagnosis. Dull headaches are to be distinguished from neuralgias of individual nerves and from migraine.

MIGRAINE is paroxysmal, lasts a short time, and leaves the patient well or even better than before. It is often accompanied by nausea, flashes of light, strong pulsations, vertigo, and pallor or congestion of the face.

NEURALGIC PAINS follow the course of a nerve, where sensitive points may be found. They are sharp and shooting in character and are often associated with suffusion of the eye and edema and with pain on pressure over the affected nerve. In supra-orbital neuralgia the pain is *on* the head, *not in* the head.

NEURASTHENIC "HEADACHE" is not a pain, but a *pressure sensation,* though on violent overexertion real pain (exhaustion headache) may occur, as in the healthy. The complaint is often of a band drawn round the forehead; in more severe cases of a lead cap feeling. "SUGGESTED" HEAD-

ACHES occur principally in morbidly suggestible women, usually arise from slight causes, and are generally associated with complaints of other bodily sensations, and, on examination, stigmata of degeneration.

NODULAR HEADACHES occur mostly in women of middle age. The pain originates in the occipital and cervical regions and is persistent and violent, and the patients are sensitive to atmospheric disturbances like rheumatics. Examination reveals millet seed to bean sized nodules in the subcutaneous tissue of the occiput and neck (indurative headaches).

Treatment of Headache.—When immediate relief is required, it is best to administer one of the analgesic drugs in a full dose (*See* Treatment of Neuralgia). In less urgent cases a *brisk purge* may first be administered and an analgesic drug or specific medication, as with quinin, potassium iodid, or iron and arsenic, may be employed subsequently. In neurotic individuals the bromids are usually indicated, together with proper exercise and *hydrotherapy*. In NODULAR HEADACHE local massage and vibration and galvanism are to be employed.

REFLEX HEADACHES come as the result of nerve exhaustion due to the stimulation from some continuous source of irritation. The treatment is of course directed against the cause, and the nervous system is temporarily quieted with hypnotics. It will be found that eye strain may be a potent factor in the production of headaches, and digestive disturbances are often found to be another cause.

When the stomach has been rendered inactive by severe mental strain or concentration it will be found that the ingestion of a glass of cold, effervescing water will give almost immediate relief. This action is mechanical as it occurs before any drug action could be possible and is due to some reflex action. Temporary relief will be given from the following prescription:

℞ Caffein citrat 3i 4,0
Sod. bromid 3ii 8,0
Sod. bicarb. 3ii 8,0
Ac. tartar 3ii 8,0
M. et div. in chart No. xii.
S.: One powder in water. To be taken while effervescing.

Some individuals who lead a "dry" life are permanently relieved of headaches by drinking two quarts of water daily.

Migraine—Hemicrania

(*Sick Headache*)

Migraine is a constitutional neurosis characterized by periodical attacks of pain, chiefly in the course of the fifth nerve.

Etiology.—It is often inherited, and is more common in women and members of neurotic families. Rheumatism and gout as latent conditions are known to be causative factors. Reflex causes are uterine disease, eye strain, abnormal conditions of the nose or nasopharynx, and carious teeth. In young patients we should suspect a reflex origin. The exciting cause may be mental or bodily fatigue, emotions, indigestion, constipation, or some particular article of food. There is a periodicity to the attacks, which usually cease after the climacteric in women and at about the same age in men.

Pathology.—We know nothing definite as to the pathological conditions. The theory that it is a nerve discharge from sensory centers, a sensory equivalent of epilepsy, seems tenable. Some call it a *vasomotor neurosis.*

Food intoxication undoubtedly plays an important rôle in the genesis of migraine, and for some years past evidence has been accumulated which connects the incidence of migraine with ductless gland disorders.

Symptoms.—Many cases show premonitory signs, such as malaise, lassitude, depression, or a sense of chilliness, lasting from a few hours to several days. Visual prodromes, such as hemi-anopsia, spots of dimness of vision or scotoma, apparitions, balls or flashes of light, and zigzag lines are common. There may be a condition of intense emotional activity. The prodromal symptoms are not always present, or they may constitute the entire attack, the headache not taking place or being very slight. Confusion of ideas, a feeling of stupor, depression, and marked disturbances of memory for several hours may exist without the headache and constitute the complete attack.

The most characteristic feature is the violent paroxysmal headache. The pain usually starts in one side of the head, over the eye, but may begin in the occiput. It increases and becomes excruciating, involving one-half of the head or, more often, the whole of it. The quality of the pain is tense, throbbing, and blinding, and it is increased by jars, light, and noises. Prostration, although temporary, is extreme. The face may be pale and pinched, and there may be a difference between the two sides. During the attack there is usually mental confusion, with temporary loss of memory. The pulse is small and hard and may be slowed. When the headache reaches its climax, nausea and vomiting commonly appear, and they afford relief. Repeated vomiting causes a regurgitation of bile and bitter vomitus, which has given the affection the improper name of "bilious headache."

The attack varies in length from a few hours to several days. After the patient has vomited and the pain has become easier, he usually falls asleep and awakes much refreshed, and the next day may feel better than before the attack. The attacks occur with considerable regularity, monthly, fortnightly, or even weekly. In women they often occur during menstrua-

tion. After a severe attack we may observe small hemorrhages in the sclera of the eye.

Prognosis.—Although the disease cannot be promptly cured, much can be done to lessen the frequency and severity of the attacks.

Treatment.—Patients are frequently aware of the causes precipitating an attack, and if they are avoided, the paroxysms are much less frequent. In children and adults, after eliminating eye strain, nasal hypertrophies, adenoid growths, enlarged tonsils, etc., we should endeavor to keep them in the best possible health by exercise, proper diet, and freedom from excitement and overstudy. As it has been demonstrated that the attacks are much less frequent during good health, the patient should be built up, the gouty and rheumatic tendencies should be corrected, and the digestive tract be kept in order by catharsis and dilute hydrochloric acid.

During the paroxysm, the patient should be put to bed and kept absolutely quiet. A cup of strong coffee often relieves the pain. Antipyrin or phenacetin, in small repeated doses, frequently gives relief. In cases where there is marked pallor, nitroglycerin, in doses of 1/100 of a grain every two hours, is helpful. Cannabis indica (gr. 1/3) (Herring's English extract), sodium bromid (gr. xxx), and chloral hydrate (gr. x to xv), are of service. A prolonged course of cannabis indica has been recommended. General massage and active outdoor exercise are to be advised. In the interval between the attacks the patient should have tonic baths and all forms of tonic hydrotherapeutics.

The possibility of a disturbed *hormone equilibrium* should not be overlooked. Thyroid gland, three grains per day, may be administered. In women the *luteal extract* (gr. v) may be given three times a day simultaneously with the thyroid preparation.

If *food intoxications* are suspected as an underlying cause of migraine, the tolerance of the individual for protein, fat, and sugar should be looked into, and a diet arranged in conformity with metabolic deficiencies elicited.

Jutte's duodenal lavage may be practiced as a prophylactic and therapeutic measure in migraine.

Drinking large quantities of water as a cure for migraine should be tried.

Gastric Crises

Etiology.—Gastric crises occur in the course of many nervous diseases and are familiar and distressing manifestations of tabes. A gastric crisis may be a premonitory sign of an approaching ataxia. The onset is sudden, with severe pain, retching and vomiting.

Treatment.—The only treatment for the severe attack is opium or morphin which must be pushed until the condition is controlled. In a mild attack the administration of 10 grains (0,6) of antipyrin in water will usually give relief. Local treatment of the gastro-enteric tract is not

indicated and is useless. Between the attacks treatment of the underlying cause must be carried out (*See* Syphilis).

Gastric crises have been observed in Pott's disease of the spine, possibly due to irritation of the sympathetic ganglia from the tuberculous process. Electrical and hydrotherapeutic measures calculated to improve the circulation of the spinal region may be tried, as occasionally a patient responds satisfactorily to these forms of treatment.

Hyperesthesia—Paresthesia—Anesthesia

Hyperesthesia, paresthesia, anesthesia and other sensory anomalies of clinical importance, may be organic or hysterical and will disappear if the underlying condition can be improved or cured.

Disturbances with Predominating Undue Motion of Central, Peripheral, or Unknown Origin

Tics

Tic Convulsif.—Tic convulsif is a very chronic disorder characterized by quick, electric-like spasms of groups of muscles or single muscles. There is a period of rest between the violent spasms. We see it limited to special nerves, especially the facial (mimic tic), or to branches of nerves, as in the orbicularis, zygomaticus, diaphragm, or tensor tympani. Sometimes the spasms are accompanied with bursts of speech, as when the patient uses obscene language (tic impulsiv, coprolalia) or involuntarily repeats the last words of a sentence (echolalia) or spasmodically imitates a gesture (echokinesis) or involuntarily speaks out a thought, sometimes against his will (tic de pensée).

This ailment begins with violent movements, which can be controlled for a time; they cease during sleep. The disease may last for years.

Treatment.—Any possible source of local or reflex irritation should be sought for, and removed, if found.

Systemic disturbances from lues, malaria, gastro-intestinal toxemia, oral sepsis, or endocrinous anomalies should receive attention.

Hygienic living, physical and deep breathing exercises, hydrotherapy, suggestion therapy, vibration, massage, electricity, will suggest themselves as therapeutic measures.

Simple Tic.—This is a peculiar trick of speech, gesture, grimace, shrug of the shoulder, twitching of the eye, or sniff, with which a person may go through life.

Neurotic and anemic children are frequently afflicted with tics, which disappear as they grow older. Rachitic infants are subject to tics in the form of head-nodding and nystagmus or carpopedal and facial spasms.

Stuttering is an improperly regulated motor impulse from the cortex of the brain.

Treatment.—Treatment for this form of tic is practically the same as that of tic convulsif. Afflicted children may have to be isolated for a time. Reflex irritation should be looked for and remedied.

Hygienic measures, diet regulation, hydrotherapy, massage, bromids, are the elements of treatment.

Occupation Neuroses

Occupation neuroses are functional nervous disorders characterized by spasmodic, tremulous, incoördinate, or paralytic disturbances with the feeling of fatigue or pain upon attempting to perform the customary function, the overperformance of which has brought it about.

Writer's Cramp.—Writer's cramp is a typical form.

Etiology.—Among the predisposing causes are heredity and a neuropathic constitution. Excessive worry, intemperance, and all debilitating influences are also predisposing. The exciting cause is excessive writing, but essential to its causation is a cramped position, in which the fingers alone are used, and the little finger or wrist is resting over the table. Free hand writing, with motions by the whole arm from the shoulder, is least harmful. Lead poisoning, exposure to wet and cold, and local injuries are sometimes exciting causes.

Symptoms.—It develops slowly with stiffness in the fingers and uncertain, jerky movements. There are fatigue and actual pain sometimes. Later, as soon as the moving of the pen is attempted, the pen is likely to fly in all directions, and there is no coördination of movement.

We may speak of four forms or degrees in order of frequency or progression, but they are usually more or less mixed.

1. The spastic form, the most common, is that in which there is a cramp, a tonic spasm of the muscles (sometimes the flexors and sometimes the extensors), usually those of the thumb and the first three fingers. The pronators and supinators may be affected. Then the thumb and first finger may alone be involved. There is also incoördination.

2. The neuralgic form is that in which, in addition to the spasm, there are fatigue, pain, and sometimes tenderness along the arm.

3. The tremulous form is rather rare. Upon attempting to write, there is a tremor of the fingers holding the pen, which may involve the forearm or even the whole extremity. It is an intention tremor.

4. The paralytic form, more rare, is that in which the fingers seem powerless to hold the pen. Persistence and will power will cause pain and weakness, so that writing becomes impossible.

There are other symptoms, mainly psychical, sensory, and rarely vasomotor and trophic. Mental depression, emotional disturbances, insomnia,

vertigo, pain, fatigue, numbness, prickling, pressure, weight, tension, constriction, etc., may be present. There may be local swelling and a sensation of throbbing. Local sweating, dryness of the skin, and cracking of the nails may result.

The *electrical reactions are not uniform.* The electrical examination may show the stage of the disease, as neuritis is undoubtedly present in some forms.

Prognosis.—The prognosis is unfavorable, but cases of complete recovery are occasionally seen and temporary improvement is frequently observed.

Other Forms of Cramp.—Musicians' Cramp.—*Pianists', violinists', flutists',* and *clarionetists' cramps* are very similar, with atrophy of certain muscles. *Telegraphers' cramp,* in which the extensors of the wrists and fingers are most affected, is rather common.

Sewing spasm, in tailors, seamstresses, and shoemakers, is occasionally seen. The muscles of the hands are seized with clonic and tonic spasms upon attempting to use them. Drivers' spasm, cigarmakers' cramp, milkers' spasm, watchmakers' cramp, and photographers' cramp are rare. Ballet dancers' cramp is probably a neuralgic affection. Artificial flower makers, billiard players, dentists, hide dressers, electrical instrument makers, stampers, turners, sewing machine operators, money counters, weavers, painters, and pedestrians also may have occupation neuroses.

Prophylaxis and Treatment of Occupation Neuroses.—As a means of prophylaxis in writers' cramp one should use a gold pen, smooth paper, and large cork or rubber penholders, making the motions from the shoulder, having the paper on the desk at an oblique angle to the edge of the desk, and far enough away from the edge so that the elbow can rest on the desk.

When the cramp has developed, rest is the most important aim. The patient should use the other hand or another holder; use other fingers or one of the appliances purposely arranged, or the typewriting machine. Massage, electricity, lotions, and exercises have cured some cases.

In the other neuroses we should secure rest by using the other hand or other muscles and by general treatment, as mentioned under Tics.

Nerve Twitchings—Tremor—Rigidity—Spasms—Myoclonus—Athetoid Movements

Nerve twitchings, tremor, rigidity, clonic and tonic spasms, myoclonus, and athetoid movements are seen as a part of some general or central disorder or as occupation neuroses.

Treatment.—The treatment calls for a search of the underlying cause and such management as is outlined under Tics and Occupation Neuroses.

Tetany—Pseudotetanus

Symptoms.—This is a subacute or chronic spasmodic disorder characterized by intermittent or persistent tonic contractions, associated with paresthesia and overexcitability of the motor and sensory nerves.

Etiology.—It is rare in this country. It occurs in infancy and childhood, at puberty, and occasionally afterward up to fifty years. It occurs more often among males, and among the poorer classes. The exciting causes are exhausting influences, such as diarrhea, lactation, sepsis, fatigue, mental shock, fevers, and exposure to cold and wet. Alcoholism, dilatation of the stomach, and intestinal parasites are causes. Extirpation of the thyroid gland may be a cause. Disturbance of parathyroid function is probably the etiological factor.

Fig. 158.—Case of Tetany in a Child. (After Strümpell, "Text-book of Medicine.")

Symptoms.—Paroxysms of bilateral tonic spasm begin in the muscles of the hands, or of the hands and feet, after prodromal tingling and stiffness, and the spasm extends toward the trunk, which is involved in severe cases. The hands assume the obstetric position, the wrists and elbows slightly flexed, arms adducted, toes flexed, feet in the equinovarus position, knees and hips extended or rarely flexed, and thighs adducted. The jaw is not affected until late, if at all. In the intervals spasm may be excited by pressure on nerve trunks or arteries (Trousseau's symptoms). The galvanic, faradic, and mechanical irritability of the affected muscles is enormously increased.

Treatment.—Remove the cause if possible. Prescribe rest, nourishing food, and tonics. Symptomatically, give bromid of potassium (℥iss to ℥ii) daily, with chloral. Chloroform and morphin may be necessary. Lukewarm baths may be of service, also ice bags to the spine. Only weak galvanic currents should be used if electricity is tried at all.

Paralysis agitans

(*Shaking Palsy—Parkinson's Disease*)

This is a chronic progressive disorder with tremor, muscular rigidity, and weakness, and with a peculiar gait and attitude. There are also sensations of heat, pain, and restlessness.

Etiology.—It is oftenest seen between fifty and sixty years of age. Exposure, hard labor, rheumatism, and rheumatoid arthritis seem to be predisposing causes. The exciting causes are fright, injury, and prolonged mental anxiety. Sciatica or rheumatism, sudden severe muscular strain, and fevers are rare causes. Anomalies of internal secretions are thought by some to be causative factors.

Symptoms.—The tremor begins after forty years of age, usually in one hand, rarely in one leg, and slowly extends to the other limb on the same side and then to the limbs on the other side. As a rule it may be lessened or stopped by effort, but continues during rest. Rarely, in an early stage, it is elicited by effort. Following the tremor, beginning in the same part and spreading in the same order, muscular weakness and rigidity appear, the muscles—especially the flexors—gradually contracting so as to cause a characteristic posture with absence of facial expression. The hands assume the "pill rolling" position. There is a slight flexion of the knees, hips, wrists, elbows, and shoulders. The extensors may be involved. The head and spine are bent forward and the face stares straight ahead. The patients are restless, uncomfortable, and unhappy and often have sensations of heat and cold. The tendon reflexes are generally normal, rarely exaggerated. Nystagmus is not present. The speech becomes affected early. The voice becomes senile, high pitched and weak, and there is a slowness in starting to talk. A patient afflicted with paralysis agitans who is propelled forward or backward cannot stop at will. The rigidity increases, as does the tremor, and finally the patient becomes bedridden and dies of some intercurrent disease. The course averages from three to twelve years.

Diagnosis.—We have to distinguish this disease from senile tremor, multiple sclerosis, and posthemiplegic tremor. In senile tremor, the tremor is an intention tremor. The head is first affected. In multiple sclerosis the tremor is more jerky, and there are nystagmus, syllabic speech, eye troubles, paralyses, and often apoplectoid attacks. Posthemiplegic tremor has the history of hemiplegia; the disease is unilateral and there are paralyses and exaggerated reflexes. Alcoholic and hysterical tremors may be mistaken for paralysis agitans.

Prognosis.—The prognosis as to life is good, but bad as to a cure. Sometimes we may stop the increase in the symptoms.

Treatment.—Physical and mental rest and fresh air should be advised,

also lukewarm baths and mild massage. The galvanic current, daily employed, gives temporary relief. Psychical treatment benefits some cases. For drugs, tonics of all kinds are used, and for antispasmodics, hyoscin hydrobromid, codein, and morphin are used. Glandular preparations should be tried, especially parathyroid preparations. *Slow* moving exercises practiced for 15 minutes 3 times a day benefit most cases.

Chorea

(*St. Vitus' Dance—Sydenham's Chorea*)

Symptoms.—A disease chiefly affecting children, characterized by incoördinate movements and involuntary muscle contractions with psychical disturbance and a tendency to rheumatic and endocardial involvement.

Etiology.—In all probability infection and toxemia are the principal etiological factors.

Prognosis.—Recovery is the rule in children, recurrences are frequent; about two per cent of cases terminate fatally.

Prophylaxis.—Hygienic living, bowel regulation, oral hygiene, treatment for anemia, prevention of brain fag in school children, are the rational measures of prophylaxis.

Clinical Varieties in Children.—

(*a*) Imitative chorea is hysteria which should be managed as such.

(*b*) Mild forms of chorea without arthritic and endocardial symptoms.

(*c*) Severe infectious chorea with arthritis or endocarditis.

Treatment. (Mild Form).—A child affected with chorea should be put to bed and have no visitors or excitement, but should be in charge of a competent person to nurse and entertain him. A daily warm bath and a daily soapsuds enema should be administered. A light and nutritious diet must be arranged. If the patient does not sleep well, one or two doses of chloral hydrate or bromural should be given at night.

Fowler's solution of arsenic (gtt. ii to v) in combination with sodium bromid (gr. v) may be given in water three times a day.

Palpitation of the heart with some rise of temperature and rheumatic pains may indicate the administration of the following:

℞	Sodii salicyl.	ʒi	4,0
	Potass. iodid	ʒss	2,0
	Tinct. aconite rad.	gtt. xv	1,0
	Aquae et syrup	ad ʒii	60,0

Sig.: One teaspoonful every two hours.

After recovery the city patient should be sent to the country or seashore and have mild general massage or vibration over the spine. If the

appetite is capricious and the tongue coated, the following digestive may be given:

℞ Acid muriatic dilut..... ʒi 4,0
Tinct. gentian co..... ʒi 4,0
Ess. pepsini..... ℥iii 90,0
Sig.: One teaspoonful after eating.

After the tongue is clean iron tropon may be given twice a day for one month.

In cases of chorea which do not respond favorably to the above treatment, the following *therapeutic measures* may be indicated:

1. *Thymus gland substance,* 5 grains 3 times a day.

2. *Magnesium sulphate* in sterile 10 per cent watery solution—1 c.c. three times a day subcutaneously.

3. *Autoserum* in 15,0 to 30,0 doses, to be injected intraspinally at intervals of three to seven days is recommended by Dr. A. L. Goodman of New York. (*See* Archives of Pediatrics, Sept., 1916.)

Grave Form.—In very severe chorea with delirium the patient must be watched constantly to prevent injury, and chloral hydrate should be given at regular intervals. If the movements are so violent as to lead to injuries, the patient should be protected by pillows or mattresses.

Septic Form.—In the septic form with endocardial involvement the writer has noted, in several cases, marked improvement following the intravenous administration of a small dose—gr. iii (0,2)—of neosalvarsan or the intravenous application of magnesium sulphate—gr. x (0,6) in ℥iii (90,0) of sterile water.

Huntington's Chorea

Huntington's chorea is a hereditary variety, which comes on after middle life and becomes steadily worse. It is associated with progressive dementia.

Treatment.—Salvarsan, magnesium sulphate, or autoserum may be tried as a curative agent (*See* Chorea).

Athetosis

(*Posthemiplegic Chorea*)

Mobile spasms under this name occur commonly in the spastic limbs of old hemiplegics—chiefly after infantile hemiplegia, but never in a limb which is completely paralyzed.

The movements are slow, irregular, twisting movements in fingers and wrists, sometimes affecting the forearm, elbow, shoulder, with an occasional hyperextension of the great toe. Athetosis is intensified by voluntary movements and cannot be controlled by voluntary effort.

Double athetosis is usually congenital and is associated with a certain degree of mental deficiency.

Treatment.—Treatment for this condition is unsatisfactory.

Hysterical Spasms

These are not based upon any gross organic lesion. A disturbance of the hormone equilibrium is a possible etiological factor.

Treatment.—The best treatment for hysterical spasms is massage and long-continued hot baths, followed by cold effusions and bromids internally. Glandular preparations may be tried, and mental suggestion is salutary.

Obstinate Hiccough

(*Also see page 863*)

Hiccough is looked upon as a reflex spasm of the diaphragm with simultaneous closure of the glottis, the pneumogastric being the centripetal and the phrenic and recurrent laryngeal the centrifugal nerves involved.

Treatment.—When associated with grave organic lesions, it may be of an obstinate type, but generally subsides on the application of one or more of the following procedures *if it is due to hysteria or gastro-intestinal disorders:*

1. Holding the breath for fifteen or more seconds.
2. Hot applications over the cervical spine and diaphragmatic area.
3. Firm pressure upon the phrenic nerve over the scalenus anticus muscle.
4. Rápid swallowing of small pieces of ice.
5. The use of antispasmodics as morphin, chloroform or valerian.
6. Traction on the tongue, intermittently applied, as in asphyxia.
7. Galvanization of the phrenic nerve.
8. Faradization of the epigastric region (Erb).
9. Forcible elevation of the hyoid bone by the attendant's fingers (Nothnagel).
10. Taking snuff.
11. Applying a bandage tightly around the body.
12. Hypodermic injections of hydrochlorid of pilocarpin.
13. Lavage of the stomach.

Disturbances with Loss of the Power of Motion Predominating (Palsies)

Cerebral Apoplexy

Definition and Etiology.—Cerebral apoplexy, to use the term in the restricted sense, is a sudden paralysis, usually with loss of consciousness, and is due to a rupture or occlusion of a blood vessel in the brain.

Forms.—We recognize two forms, *intracranial hemorrhage,* from rupture of a vessel, and *acute softening,* from thrombosis or embolism.

Pathology.—The usual condition leading to apoplexy is chronic endarteritis. This disease of the walls of the arteries tends to the obliteration of the lumen of the vessel, to fibrin deposits on the roughened wall producing *thrombosis,* to embolism in consequence of this deposit being washed onward, and to erosions and ruptures producing hemorrhage. The kind of paralysis varies with the part of the brain in which this lesion takes place.

Etiology.—The age of liability to hemorrhage is between forty-five and sixty-five. Males are more liable to hemorrhage than females. The predisposing causes of endarteritis are gout, alcoholism, and syphilis, and nephritis, endocarditis, and emphysema are often associated. As an exciting cause of hemorrhage we may include anything which increases the heart's action (heart strain), such as fright, anger, exertion, or a cold bath. Anything weakening the action of the heart may cause thrombosis.

Symptoms.—Premonitory queer, dull, heavy feelings in the head, vertigo, insomnia, headache, inattention, imperfect memory, and temporary attacks of numbness in half of the body may occur for months before the onset. If we can rule out *digestive disturbances,* which produce practically the same symptoms, and kidney lesions, etc., we should look after the circulation, examine the arteries, and guard against the attack by advising avoidance of the exciting causes.

The attack comes on suddenly, with unconsciousness usually, although in very light types there may be no unconsciousness or it may be slight. It is usual for paralysis of one-half of the body (hemiplegia) to occur with coma and convulsions. The face is red; the pulse slow, full, and of high tension; the respirations deep and stertorous. The temperature may be subnormal or normal, but after some hours it may reach from 102° to 104°. The head may deviate to the side of the lesion. The pupils vary, but usually there is dilatation on the side of the lesion. There may be *hemiplegia, hemi-anesthesia,* and *hemi-anopsia* at first. The reflexes are at first inhibited, to become permanently exaggerated later. There is rigidity of limbs when the hemorrhage is large, and convulsions are observed when it is on the cortex. The urine and feces may be passed involuntarily, or the urine may be retained and may contain albumin and sugar. Death may occur in one or two days, in coma with high temperature. Usually there is slow recovery of consciousness; the paralysis gradually improves for a year and then remains stationary.

The symptoms, after a week, indicate the situation of the lesion, and those remaining at the end of a month indicate its extent. If contractures in the paralyzed limbs develop, they indicate descending degeneration in the motor tract. With the *hemiplegia* we observe flatness of the face on the paralyzed side; the muscles slightly draw it from this side;

the eye can be closed and moved; the tongue deviates toward the paralyzed side; the finer motions of the hand and arm are more permanently affected than the elbow or shoulder motions; the upper extremity is carried in a flexed position; the leg is stiff and extended and does not bend easily at the knee, and the foot is dragged on its inner edge and swung around in walking. The trunk and respiratory muscles are very rarely affected. The control of the bladder and rectum may not be complete. Hemi-anesthesia and hemi-anopsia may remain without hemiplegia. The contractures developing may cause pain. Aphasia of some kind may accompany a right-sided hemiplegia, or it may occur alone.

Mental affections sometimes appear and may remain as the only permanent symptoms. The patient may not be able to control his emotions, so that he laughs or cries upon slight cause, shows irritability of temper, lack of judgment, imperfect memory of recent events, imperfect concentration of the mind, general bewilderment, not recognizing his surroundings or friends, mild delirium or delusions, or even dementia. These usually pass away. Epileptoid attacks may develop and recur at long intervals after an attack of apoplexy.

Hemorrhages occur after the age of fifty-five, as a rule, with atheromatous arteries and an hypertrophied heart. The onset is sudden, with coma, during exertion or excitement. The temperature falls in an hour, and then rises, sometimes to 106°. Gradual recovery of consciousness takes place in from three to five days, with permanent hemiplegia.

Cerebral Embolism

Cerebral embolism comes on at any age, with heart disease or after childbirth. There is a sudden onset, without loss of consciousness or with slight mental confusion or with rapid return to consciousness. The temperature does not fall, but may rise as high as 102°. Improvement occurs within twenty-four hours to a marked degree, but after three or four days the symptoms return. Monoplegia, hemiplegia, or aphasia may remain. Jacksonian epilepsy may develop if the lesion is cortical, involving a special center.

Cerebral Thrombosis

Cerebral thrombosis occurs at any age, but chiefly in syphilitic persons and middle-aged men. There are usually premonitions. The onset is slow, without coma, but with dullness of the mind. The temperature does not fall, but may rise to 100°. The paralysis is similar to that observed in embolism.

Diagnosis.—The diagnosis between this condition, cerebral apoplexy, and cerebral embolism is hardly ever positive.

Prognosis.—The prognosis depends upon the depth and duration of

the coma, on the condition of the pulse and respiration, on the constitution and age of the patient, and on the number of previous attacks.

Prophylaxis and Treatment of Cerebral Apoplexy, Embolism, and Thrombosis

Prophylaxis.—If the above enumerated promonitory symptoms go hand in hand with high blood pressure, venesection should be performed at intervals of six months and the therapeutic management for arteriosclerosis should be established.

Treatment.—In the stage of apoplexy we should employ rest, quiet, and an ice bag to the head; venesection in plethoric cases; and purgatives of a drastic nature. Stimulants should not be given unless the heart fails. Care in feeding is necessary, on account of possible inability to swallow. Later, for the paralysis, we may try exercise, massage, vibration, and faradism to the muscles and iodid of potassium internally.

If the Wassermann reaction is positive, mercury by inunction or by subcutaneous injection is indicated.

Treatment of Apoplexy Due to Hemorrhage.—The patient should be handled with the utmost care. He should be undressed and put to bed on his back or on the non-paralyzed side, with his head somewhat elevated. The latter position allows the saliva to escape and prevents obstruction of the larynx. Cyanosis, full pulse, deep coma, labored respiration, are indications for the removal of twelve to sixteen ounces of blood by venesection, if done within a few hours after the attack.

Instead, mustard paste to the legs or back of the neck may be applied. An ice bag to the head will help to relieve congestion. Rest and quiet are the most essential factors. Convulsions may be stopped by chloroform inhalation and chloral hydrate by rectum, and the bowels may be purged by one or two drops of croton oil in butter or olive oil placed on the tongue.

Food is to be withheld until there is hunger, and then fluids only should be given for several days. If necessary, gavage or rectal feeding may be employed. Heart stimulants are as a rule to be avoided; if necessary, camphor in oil will be found most satisfactory.

For *restlessness,* sodium bromid up to thirty grains, and for *sleeplessness,* bromural, veronal or trional—ten to fifteen grains—may be given. The bowels and the bladder should be well looked after, and great cleanliness is essential to prevent decubitus.

Treatment of Apoplexy Due to Thrombosis or Embolism.—In apoplexy from thrombus or embolus, venesection, purgation, ice on the head, are contra-indicated. Instead, stimulants and vasodilators are to be used, such as whiskey, cognac, coffee, or hot drinks per mouth, or whiskey with hot water as an enema. Nitroglycerin or sodium nitrite—two to

three grains every four hours—caffein. Hoffmann's anodyne, the inhalation of ammonia and heat to the body, are to be advised. Rest should be absolute. In cases of *restlessness,* sodium bromid or chloral hydrate may be substituted for the caffein.

If there is *doubt as to the cause of hemorrhage or embolism,* it is best to simply secure rest and to treat symptomatically and according to the general plans above outlined.

For two or three weeks after the seizure the patient must not be allowed to make any effort whatever; not for a week or so after voluntary movements of the paralyzed limb are possible, should the patient be permitted to sit or stand up. The diet should be fluid.

For the *hemiplegia,* the treatment may be begun after the second week, with massage once or twice daily for fifteen to twenty minutes, passive motions, the faradic current for the exercise—especially of the muscles of the wrist, hand, ankle, and knee—and the patient should be encouraged to make voluntary movements in the paralyzed limb, and some simple mechanical device may be improvised for the purpose. The bed clothes should be kept smooth and free from bread crumbs, etc., to prevent decubitus.

Cranial Nerve Palsies

(*Excepting Olfactory, Optic and Auditory Nerves*)

Third Nerve (Oculomotor) Palsies

Disease of the third nerve or pressure upon it gives rise to external strabismus, ptosis, dilatation of the pupil, loss of the pupil reflex and of accommodation to distance, and diplopia. The paralysis may be due to a neuritis, especially one associated with locomotor ataxia, and may follow diphtheria or may be due to pressure from the exudate of a meningitis, tumor, or aneurism, or to rheumatism, syphilis, or to an attack of migraine. The excessive use of tobacco is also a cause.

The course is usually subacute, lasting for a few weeks. Functional palsies last only a few days, and the periodical palsies occur once in a year or six months. The latter are accompanied with some pain at first, and last a few days or weeks. Syphilitic palsies last from one to three weeks, but are apt to relapse and to be very obstinate.

Treatment.—Treat the underlying cause and apply faradism, galvanism, and vibration.

Fourth Nerve Palsies

(*Nervus trochlearis*)

Fourth nerve palsies are rare. Convergent strabismus and diplopia result. The causes are the same as those of third nerve palsies.

Fifth Nerve Palsies

(*Nervus trigeminus*)

These may be nuclear, central, meningeal, or peripheral in origin. Those of central origin usually accompany hemiplegia. Palsy of nuclear origin is rare. It usually accompanies glossolabial or diphtheritic palsy or some gross lesion of the pons. When it is of meningeal origin, from tumors, meningitis, or fracture at the base of the skull, it is usually accompanied by lesions of the other cranial nerves. Syphilis is often the cause. The temporal and masseter muscles are paralyzed and the jaw, when depressed, moves toward the paralyzed side. Both speech and swallowing are interfered with. Through a little branch of the fifth nerve passing to the tensor tympani, we may get deafness and tinnitus aurium, when the fifth nerve is affected.

Treatment is that of the underlying cause.

Sixth Nerve Palsies

(*Nervus abducens*)

Sixth nerve palsies are the most frequent, and they cause convergent strabismus and diplopia. Locomotor ataxia and syphilis are most often associated with this form of palsy.

Muscular Asthenopia and Muscular Insufficiencies.—These produce or indicate a lack of equilibrium in the eye muscles so that the visual axes cannot be kept parallel without effort. This muscular effort may be unconscious, but it is likely to cause disturbance of vision, vertigo, migraine, cerebral paresthesia, and pains in the head, particularly in the occipital and cervical regions.

Treatment.—Proper lenses will usually correct these insufficiencies, but sometimes operative measures are necessary.

Facial (Seventh Nerve) Palsy

(*Bell's Palsy*)

Etiology.—This common type of peripheral paralysis is usually due to exposure and rheumatic infection. It occurs most often between the ages of twenty and forty, and in males. Winter is the season in which we find it most often. A neuropathic or rheumatic tendency predisposes to it. In syphilis we rarely observe a facial paralysis. It may occur in multiple neuritis and locomotor ataxia. Some cases, not typical, however, are due to injuries (such as fracture of the petrous portion of the temporal bone) or ear disease. The use of the forceps in labor has caused some cases and a few have been congenital. Pathologically Bell's palsy is to be looked upon as a neuritis.

Symptoms.—The trouble comes on suddenly and reaches its height within a few hours or at most within two or three days. Some pain and swelling around the ear may precede it. The appearance of the face is characteristic. On the affected side there are no wrinkles, the angle of the mouth is lower, and the mouth is drawn toward the sound side. Owing to this, it looks as if the tongue could not be protruded straight. In trying to wrinkle the face, as in laughing or showing the teeth or making a grimace, the paralysis is distinctly shown. The eye on the palsied side cannot be perfectly closed, and the eyeball turns up. The eye is likely to be watery and the conjunctiva somewhat injected. The nostril on the paralyzed side does not expand on forced inspiration. If the disease extends into the fallopian canal, paralyzing the stapedius muscle, there is oversensitiveness to sounds. By noting the ear and taste involvements, the situation of the lesion can be accurately determined. Some wasting of the face may usually be made out after a few weeks.

There are great variations in the electrical reactions, which are in proportion to the severity of the case. Typical or partial degeneration reactions can usually be observed. The patient feels a subjective discomfort on the paralyzed side. He cannot pucker the lips or close the eye on that side. In chewing, the food gets between the cheek and teeth. The speech is slightly muffled. *Secondary contractures* begin to appear if the disease lasts for two months or more, and the mouth is drawn toward the affected side. The nasolabial fold becomes deeper than on the sound side.

Diagnosis.—By asking the patient to make a grimace we get the characteristic expression. It is important to find out whether the palsy is cerebral, nuclear, basilar, or peripheral. If it is cerebral in origin, the upper branch is little affected and the patient can close his eye. There is no reaction of degeneration.

Nuclear palsy is very rare. There are other symptoms, especially those of the involvement of other cranial nerves. A history of diphtheria, lead poisoning, or bulbar paralysis can usually be obtained. If it is *basilar* in origin, such as is due to a gummy meningitis, there are signs of brain syphilis and the involvement of other cranial nerves. Most cases are peripheral in origin.

Prognosis.—The prognosis of Bell's palsy is good, although often there is not complete recovery. If it is syphilitic in origin, the prognosis is good. If it is of central origin, the prognosis is not good. The paralysis of peripheral origin usually lasts from three to five months, but very mild cases become normal in a month. According to the completeness of the reaction of degeneration is the prognosis as to duration.

Treatment.—Acute peripheral palsies demand prompt purging and diuresis and a blister over the exit of the nerve. Hot fomentations may follow. Salicylate of sodium in full doses should be given for a week. After the paralysis is established, give potassium iodid in moderate doses.

Electricity should be used carefully at first. After a week, give it daily for five minutes, and use the galvanic current, just strong enough to contract the muscles. Vibratory massage is efficacious. If after a time the faradic current causes a contraction, it may be used. After a month, the applications can be made on alternate days. If the paralysis is severe, a mechanical device may be used during the day to hold up the corner of the mouth, such as a hook fastened behind the ear. The eye should be protected.

Glossopharyngeal (Ninth Nerve) Paralysis

This condition is described under Paralyses of central origin (glossolabiolaryngeal paralysis, page 755).

Pneumogastric (Tenth Nerve) Paralysis

The nucleus may be involved by hemorrhage, tumor, softening, or slow degeneration. In bulbar paralysis the nucleus of this nerve is involved. The nerve root may also be involved within the cranium. In the neck, the pneumogastric may be injured by wounds or accidentally during operations. As there are branches to the pharynx, larynx, lungs, heart, esophagus, and stomach, we shall speak of these branches separately.

1. A paralysis of the pharyngeal branches, from bulbar degeneration, or a postdiphtheritic neuritis causes difficulty in swallowing and permits food to enter the larynx or, if the soft palate is also involved, to be regurgitated through the nose.

2. A paralysis of the laryngeal branches may cause a variety of symptoms, which are described in Section VIII.

3. A lesion of the pulmonary branches is supposed to exist in the shape of a neurosis, where there is bronchial asthma.

4. Paralysis of the cardiac branches abolishes the inhibitory action, and we observe *tachycardia*. It may occur with a diphtheritic neuritis, wounds, or accidental injuries of the vagus, or the nerve trunk may be involved by tumors or by poisons depressing the vagus nucleus. *Irritation* of the nerve causes a slowness of the heart's action. *Bradycardia* may follow irritation of the nucleus, as by compression by tumors, or it may be a pure neurosis.

5. Paralysis of the esophageal branches gives rise to difficulty in swallowing, which may simulate stricture.

6. Paralysis of the gastric branches may cause a partial loss of power of the stomach to contract.

Treatment.—The treatment of all such conditions depends upon the underlying cause.

Spinal Accessory (Eleventh Nerve) Paralysis

The spinal accessory (eleventh nerve) paralyses are seen in loss of function of the sternomastoid and trapezius muscles. This nerve is con-

cerned in some cases with the pneumogastric in bulbar paralysis. Massage, vibration, and possibly antiluetic treatment are indicated.

Hypoglossal (Twelfth Nerve) Paralysis

The hypoglossal (twelfth) nerve is also concerned in bulbar paralysis. When the trouble is nuclear in origin, it may occur with locomotor ataxia or from acute softening from obstruction of blood vessels, and the symptoms are usually bilateral. The tongue atrophies. If the cause is supranuclear, paralysis of the tongue occurs on the side opposite to the lesion, and the tongue does not waste. It is usually associated with hemiplegia. If the cause is infranuclear, it may be from tumor, meningitis, pressure from bony caries, or a neuritis from rheumatism or lead poisoning. The tongue atrophies, and the reaction of degeneration is present.

Symptoms.—In bilateral palsy the tongue cannot be protruded. In unilateral paralysis it deviates toward the paralyzed side when protruded. According to the extent of the paralysis is the interference with articulation and mastication.

Treatment.—The treatment is symptomatic or antisyphilitic.

Bulbar Paralysis

(*Glossolabiolaryngeal Paralysis*)

This is a rare disease characterized by a slowly progressing paralysis with atrophy in the motor cranial nerve nuclei. There is an acute form, differing only from the chronic by the suddenness of the onset.

Etiology.—There are small hemorrhages into the medulla in acute bulbar paralysis, and areas of softening following embolism or thrombosis. It is an acute inflammatory affection analogous to anterior poliomyelitis, or it may be due to a terminal lesion of Landry's paralysis. It is almost regularly bilateral.

Symptoms.—There is disturbance of the speech—alalia (impaired articulation of the labial letters *r, l, d,* and *t*); atrophy and tremor of the tongue occur, with paralysis; and chewing and swallowing are impaired. The muscles of lips and face become weak and thin, and we observe impairment in pronunciation of the labial letters *p, b, v,* and *f,* also atrophy and tremor of the lips with paralysis. Whistling is impossible and the facial expression is impaired. The saliva is increased and runs from the mouth. The action of the muscles of the pharynx and larynx is impaired; food regurgitates or cannot be swallowed; the reflex action is impaired and the larynx is therefore unprotected; the voice is low and monotonous; and it is impossible to cough. There is no change in the sensation of taste. The pulse is sometimes rapid—100 to 130. The duration is from two to five years.

Diagnosis.—The differential diagnosis should be made from pseudobul-

Electricity should be used carefully at first. After a week, give it daily for five minutes, and use the galvanic current, just strong enough to contract the muscles. Vibratory massage is efficacious. If after a time the faradic current causes a contraction, it may be used. After a month, the applications can be made on alternate days. If the paralysis is severe, a mechanical device may be used during the day to hold up the corner of the mouth, such as a hook fastened behind the ear. The eye should be protected.

Glossopharyngeal (Ninth Nerve) Paralysis

This condition is described under Paralyses of central origin (glossolabiolaryngeal paralysis, page 755).

Pneumogastric (Tenth Nerve) Paralysis

The nucleus may be involved by hemorrhage, tumor, softening, or slow degeneration. In bulbar paralysis the nucleus of this nerve is involved. The nerve root may also be involved within the cranium. In the neck, the pneumogastric may be injured by wounds or accidentally during operations. As there are branches to the pharynx, larynx, lungs, heart, esophagus, and stomach, we shall speak of these branches separately.

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6. Paralysis of the gastric branches may cause a partial loss of power of the stomach to contract.

Treatment.—The treatment of all such conditions depends upon the underlying cause.

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The spinal accessory (eleventh nerve) paralyses are seen in loss of function of the sternomastoid and trapezius muscles. This nerve is con-

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Symptoms.—There is disturbance of the speech—alalia (impaired articulation of the labial letters *r, l, d,* and *t*) ; atrophy and tremor of the tongue occur, with paralysis; and chewing and swallowing are impaired. The muscles of lips and face become weak and thin, and we observe impairment in pronunciation of the labial letters *p, b, v,* and *f,* also atrophy and tremor of the lips with paralysis. Whistling is impossible and the facial expression is impaired. The saliva is increased and runs from the mouth. The action of the muscles of the pharynx and larynx is impaired; food regurgitates or cannot be swallowed; the reflex action is impaired and the larynx is therefore unprotected; the voice is low and monotonous; and it is impossible to cough. There is no change in the sensation of taste. The pulse is sometimes rapid—100 to 130. The duration is from two to five years.

Diagnosis.—The differential diagnosis should be made from pseudobul-

bar paralysis of cerebral origin, where the lesion is in the lower portion of the third frontal convolution, and is not followed by atrophy. In *myasthenia gravis* no pathological changes have been found. Death occurs from inanition, aspiration pneumonia, or heart failure.

Treatment.—When deglutition becomes impaired, we may feed the patient with the stomach tube. We may give large doses of strychnin early in the disease. Antiluetic treatment may be indicated.

Ophthalmoplegia

Progressive ophthalmoplegia is a rare disease due to progressive atrophy of the nuclei of the motor nerves of the eye. According to which muscles are involved, there may be ophthalmoplegia externa or interna.

Ophthalmoplegia externa is the more common. There is a gradually increasing loss of power in all the muscles of the eyeball. We therefore observe ptosis, strabismus, nystagmus, immobility of the eyeball, and double vision.

Ophthalmoplegia interna, exceedingly rare, causes loss of the reflex to light, and is a symptom in locomotor ataxia and general paresis.

Diagnosis.—The diagnosis should be made from paralyses of the single nerves (the third or the sixth nerve) by the facts that such a paralysis is unilateral and that only the muscles supplied by that nerve are affected.

Treatment.—If vibratory massage and iodid of potassium fail to improve matters, the case is hopeless.

Pressure Palsies

Pressure palsies of cerebral origin, from the *pressure of inflammatory* products, such as tumors and abscesses, include acute pachymeningitis externa, acute pachymeningitis interna, chronic pachymeningitis interna, acute meningitis, chronic meningitis, and meningeal hemorrhage, which are described under the separate headings: Meningitis, Tumors, Abscess, and Brain Syphilis.

Myasthenia gravis

Definition and Symptoms.—A disease characterized by rapid and excessive tiring of voluntary muscles—especially those of the face. There is rapid fatigue on repeated faradic stimuli.

Etiology.—No satisfactory explanation has as yet been given for this disease, which in all probability is of neurogenic origin.

Treatment.—In the absence of any definite line of treatment the aim should be to keep up the body nutrition. The following will be found helpful: good food and hygienic surroundings; hand massage daily for fifteen minutes; warm or hot packs followed by cool douching or showers; strychnin in doses of one-sixtieth of a grain three times daily; arsenic, the

hypophosphites, and the glycerophosphates should be kept up alternately for long periods. Calcium lactate has also been tried. Rest in bed and rest from eye strain should be part of any treatment tried. Various glandular preparations may be tried. A polyglandular solution (Marvell) may also be administered.

Myelitis

Definition.—Myelitis is a disseminated inflammation of the cord, or it may involve an entire segment of the cord, both gray and white matter.

Etiology.—Infection, injury, disease of the vertebrae, or tumors, causing compression or destruction of the cord, are among the causes. It may result from acute infectious diseases, especially smallpox, measles, and typhus fever. It may follow the primary lesion of syphilis within a year or eighteen months, and the growth of gummata may be the cause of compression. Chronic alcoholism is mentioned as a cause. Males are more often affected than females, particularly soldiers and porters.

Varieties.—We speak of *acute, subacute,* and *chronic cases.* Also, according to the amount of cord tissue diseased and its situation, we speak of *general myelitis,* where the entire cord is affected, ascending or descending; *disseminated myelitis,* where various segments at different levels are affected; and *transverse myelitis,* where one or two segments at one level are affected.

Symptoms.—Direct symptoms result from destruction of tissue in the cord. According to the situation of the lesion in the cord do we observe the distribution of direct symptoms. General myelitis gives rise to universal symptoms, disseminated myelitis causes scattered symptoms, and transverse myelitis limits them to one level. The *motor symptoms* are paralysis, atrophy, loss of muscular tone, and the reaction of degeneration. The *reflex symptoms,* according to the situation of the lesion, are paralysis of the bladder and rectum, and impotence. The *sensory symptoms* are numbness, anesthesia, paresthesia, hyperesthesia, and pain. The back is tender to heat sensations. The *vasomotor and trophic symptoms* are bedsores, profuse sweating, and imperfect circulation with coldness of the skin. A knowledge of the spinal nerves and their distribution is necessary to ascertain the level of the disease in the cord.

Indirect symptoms are due to the interruption of the impulses normally passing through the cord. Below the lesion there is paralysis, with increased reflexes, muscular rigidity, and contractures. The paralyzed muscles do not undergo atrophy. There is a change in electrical reaction. The bladder is usually not paralyzed, but there is loss of control, with priapism. Although there is imperfect sensation, coördination remains intact. The anesthesia permits of the formation of bedsores over the sacrum, glutei, heels, and ankles. There is moderate fever.

Course.—General myelitis and disseminated myelitis may be acute or

subacute in their onset. The disease begins with weakness of the limbs, pains in the back and limbs, and prostration, and then there follow paralysis, pain and anesthesia, and bladder and rectal symptoms, with confinement in bed and the development of bedsores. The course is slow, from one to three years. Occasionally there is a slow imperfect recovery. Usually death takes place from cystitis, bedsores, or pneumonia. TRANSVERSE MYELITIS, when acute, may rarely develop in two days. It comes after an injury, blow, fall, wounds, dislocation of the spine, or a strain, which causes a hemorrhage in the cord. It may arise from an embolus of a spinal artery. Its course is chronic after spinal caries with deformity and pressure, or after a tumor in the spinal cord or canal. The length of its course depends upon the possibility of removing the cause.

Diagnosis.—The diagnosis of myelitis is rarely difficult. LANDRY'S PARALYSIS and some cases of multiple neuritis and meningitis show similarities. Landry's paralysis shows very slight sensory disturbances, no trophic symptoms, very seldom bladder and rectum paralyses, and no electrical changes.

In MULTIPLE NEURITIS the sensory symptoms are marked, but there is rarely if ever complete anesthesia, there is no affection of the bladder and rectum, there are no bedsores, there is no oversensitiveness of the spine to heat, and the distribution of the symptoms is peripheral.

In MENINGITIS the onset is slower, the fever is high, and the pain in the back, body, and limbs and the hyperesthesia are severe; there is no anesthesia, but there are early spasms of the limbs and back, with rigidity of the back; there is only apparent paralysis, due to fear of pain on emotion, no atrophy, no paralysis of the sphincters, no bedsores, and no cystitis.

Treatment.—In the early stages, try to remove the cause. Have the patient lie on the side or face, and cup the spine or apply an ice bag, counterirritation, or a warm douche. Give sedatives, and purge thoroughly with calomel and salts. When the onset is gradual or the course is chronic, use counterirritation to the spine, cups, blisters, and the cautery or ether spray, but not if there is a tendency to bedsores. Baths and douches, tepid or cold, may be used over the spine. The limbs should be massaged and hot baths be given for rigidity. Electricity, vibration, and massage may be used to exercise the muscles. The diet should be regulated, and the general strength kept up as well as possible. Avoid cystitis by aseptic catheterism, and bedsores by careful padding or the use of a water bed, and by sponging with alcohol and alum water. If cystitis or bedsores develop, treat them with antiseptic irrigation and dressings.

For the *pain,* use heat or the faradic brush. Give antipyrin, acetanilid, phenacetin, bromids, morphin, or salicylic acid. For the spasms, we may give bromids and apply heat to the spine or cups or hot baths to the legs. If rigidity appears, we may use mechanical appliances and massage. For

incontinence of urine, a urinal should be worn, or the urine absorbed in cotton.

In the chronic cases we may use potassium iodid, strychnin, arsenic, and phosphorus. In the syphilitic cases we should use large doses of mercury and potassium iodid or an inunction course or salvarsan.

Spinal Apoplexy

Hemorrhage into the spinal cord (hematomyelia, intramedullary hemorrhage) has been observed in tetanus, strychnin poisoning, and conditions leading to sudden asphyxia. It may complicate inflammation and tumors. It may be due to blows, falls, convulsions, or the hemorrhagic diathesis.

Symptoms.—The symptoms are irritative and paralytic.

Prognosis.—The prognosis is not so good in intramedullary as in extramedullary hemorrhage.

Treatment.—The treatment is symptomatic, in the hope that absorption may take place.

Spinal Progressive Muscular Atrophy—Wasting Palsy

(*Aran-Duchenne's Disease*)

Etiology.—The disease is most frequent in males between twenty-five and forty-five years old. An hereditary factor may rarely be present. Great mental strain, physical exertion, exposure to wet and cold, traumatism, acute infectious diseases—especially typhoid, measles, cholera, and acute rheumatism—childbirth, syphilis, and, more especially, lead poisoning, are the causes.

Pathology.—The primary lesion is in the anterior horns of the spinal cord.

Symptoms.—The disease begins gradually and insidiously in the fingers and interossei muscles and travels upward and downward. There are slight rheumatoid pains in the shoulder or arm. The muscles tire easily and become less firm. Muscular atrophy usually appears first in one hand, in the interossei and the ball of the thumb. The atrophy spreads from muscle to muscle. Motor weakness is proportionate to the atrophy, and there is no essential paralysis. The hand assumes the characteristic appearance, called *claw* (*main en griffe*). In a few cases the deltoid is affected first, and the atrophy descends, constituting the *upper arm type.* In from three to nine months the other arm begins to be affected. In rare cases the atrophy may begin in the lumbar or abdominal muscles of the legs, and ascend (perineal type).

The atrophied muscles are flaccid and usually retain their normal electrical reactions (differential factor between chronic anterior poliomyelitis and amyotrophic lateral sclerosis, in which there is a spastic condition with rigid muscles). The reflexes are diminished according to the amount of

atrophy. Fibrillary twitchings occur. When the lumbar muscles are implicated, the back is arched and the line of gravity falls behind the sacrum. When the abdominal muscles are affected, the back is arched, but the line of gravity falls in front of the sacrum. In time, all the voluntary muscles may be involved. The face muscles are normal, but the body is greatly wasted. Ophthalmoplegia externa and bulbar paralysis may develop toward the close of the disease.

Prognosis.—The course is usually progressive. Death may come from exhaustion, bulbar paralysis, or respiratory affections. The patient may live for years, the disease becoming quiescent.

Treatment.—The treatment does no permanent good and is symptomatic or antisyphilitic. Gland preparations may be tried (pituitrin).

Progressive Hereditary Muscular Atrophy—Perineal (Charcot Marie) Type

This is an hereditary, or family, muscular atrophy beginning in the legs and extending upward. It is not known whether it is central or peripheral in origin. Almost always it begins before the age of twenty, and affects males oftener than females.

Symptoms.—First the muscles of the leg, then the extensors of the toes, and then the calf muscles are affected. Later the thigh muscles, and after some years the muscles of the forearm and hand are reached. The shoulder, arm, neck, and trunk muscles escape. Fibrillary contractions are occasionally present, and there is always a partial or complete reaction of degeneration. The disease continues for years, with remissions, and although it is not curable, the prognosis is better than in the arm type.

Treatment.—The treatment is the same as that in other forms of hereditary muscular atrophy. Gland preparations (pituitrin) and salvarsan may be tried.

Hereditary Ataxia

(*Friedreich's Ataxia*)

Although this is not necessarily an hereditary disease, it is really a family disease, as several brothers and sisters may be affected. When it is hereditary, there is usually a family history of some nervous disorder—insanity, inebriety, or nervous irritability. It is apt to appear between the fifth and fifteenth years.

Pathology.—There is sclerosis of the posterior and lateral columns of the spinal cord, which may extend upward.

Symptoms.—The ataxia begins in the legs, but it is different from that of locomotor ataxia, for the gait is more swaying and irregular and there is less stamping. Romberg's symptom is sometimes present. The deep reflexes are lost early. Later, ataxia develops in the arms, causing choreiform movements, which may be observed during rest. Nystagmus and a

slow, scanning speech are commonly observed. Optic atrophy and viscera symptoms are uncommon. Trophic changes are not observed. There is a fairly characteristic deformity of the foot. The patient walks on the outer edge of the foot, with the big toe flexed dorsally upon the first phalanx. Talipes equinus develops. There are no sensory symptoms. Late in the disease the mind becomes impaired, and paralysis appears, which may become complete. The affection is incurable and extends over many years. Care should be taken to prevent contractures.

Treatment.—There is no effective treatment. Gland preparations (pituitrin) and salvarsan may be tried.

Ataxic Paraplegia

(*Combined System Sclerosis*)

This is a disease developing in males of middle age and characterized by a combination of ataxia and paraplegia. There may be a history of infection or of sexual excesses, but a history of syphilis is seldom to be obtained.

Pathology.—There is a combined sclerosis of the posterior and lateral columns of the cord, beginning in the lumbar region. The nerve roots are not involved, as in locomotor ataxia.

Symptoms.—Slowly developing weakness of the legs occurs, with rigidity and ataxia. The knee jerk is *exaggerated,* and the ankle clonus can be elicited. Romberg's symptom is generally well marked, developing later, but eye symptoms are rare. For sensory symptoms we observe usually only a dull aching pain in the sacral region, etc. The ataxia and weakness may extend to the arms. Finally paralysis and failure to control the sphincters develop. Mental symptoms, similar to those in general paresis, may develop.

Diagnosis.—From the combination of marked incoördination with more or less spasm and presence of the reflexes, the diagnosis is easy. The absence of ocular and sensory symptoms is an important point. It is, in short, a motor weakness, with symptoms of tabes.

Prognosis.—The disease is incurable. Death results from complications.

Treatment.—The treatment is symptomatic. Pineal and thyroid gland preparations should be tried (also pituitrin).

Amyotrophic Lateral Sclerosis

This is really a form of progressive muscular atrophy, with the same etiology, differing by showing spastic symptoms and paralysis.

Symptoms.—The symptoms result from a combination of progressive muscular atrophy and lateral sclerosis. Wasting, weakness, rigidity, contractures, and exaggerated reflexes develop. Atrophy and weakness are especially marked in the arms and hands, while in the legs the spastic

paraplegia develops early. Muscular fibrillary twitchings are usual. The bladder and rectum are controlled, and there are no sensory symptoms. Rigidity and muscular wasting become general, and paralysis results. Symptoms of bulbar paralysis and ophthalmoplegia externa make their appearance.

Prognosis.—The prognosis is not so good as in progressive muscular atrophy. The disease is seldom if ever arrested, and death results in from one to four years.

Treatment.—Treatment gives no satisfactory results. Mercury and salvarsan may be tried, also gland preparations (pituitrin).

Lateral Sclerosis

(Spastic Spinal Paralysis)

Lateral sclerosis (spastic spinal paralysis) is a chronic sclerotic process affecting the lateral pyramidal columns of the spinal cord. If it is a primary disease, which is exceedingly rare, it is bilateral.

FIG. 159.—FAMILY SPASTIC SPINAL PARALYSIS. (After Strümpell, "Text-book of Medicine.")

Secondary lateral sclerosis is the most frequent form of spastic paraplegia, and results from any lesion in which the central motor neurone is involved. These lesions may be: tumors, softening, or hemorrhage in the brain; congenital maldevelopment of the brain and hydrocephalus; or a cord lesion, unilateral or bilateral, or compression of the cord by disease of the vertebrae or myelitis and meningomyelitis.

Symptoms.—Idiopathic spastic paraplegia shows a weakness and stiffness in motion, beginning in the legs and ascending, and finally involving the arms. Atrophy is not present. Reflex and mechanical excitability is increased, causing increased knee jerk and the presence of ankle clonus. There is rigidity from increased spinal activity, making the gait characteristic. This is at first spastic; the toes drag, the knees overlap, motion is stiff, and finally, in complete paralysis, the legs are drawn up, the knees overlap, and are so rigid that the patient cannot move them. The muscles show no degeneration reaction.

There is, late in the disease, impairment in the control of the bladder, which finally results in paralysis with involuntary emptying or with retention. Constipation is obstinate. The bladder and rectum are not affected in some cases of primary sclerosis. No sensory symptoms are present. Nutrition is impaired and the vascular tone is diminished toward the end of the disease, causing blueness and coldness. Death is rare from this disease by itself. The symptoms develop slowly and increase until, after many years, permanent paralysis develops.

Treatment.—The treatment is symptomatic. Gland preparations, including pituitrin, and salvarsan may be tried.

Acute Ascending Paralysis

(*Landry's Paralysis*)

Etiology.—This form of paralysis is due to *infection*. It is most common in men between the ages of twenty and thirty. It is probably one of the forms of poliomyelitis.

Symptoms.—At first there is a weakness of the legs, which may in a few hours merge into paralysis. This spreads to the trunk, arms, and neck. The muscles of respiration, deglutition, and articulation, and sometimes those of the face and eyes, are affected in a few days. Although the muscles show no wasting or the electrical reaction of degeneration, the reflexes are lost. The sensory symptoms are neither constant nor essential, but there may be numbness, tingling, or hyperesthesia. The bladder and rectum are seldom involved. The spleen is sometimes enlarged.

Prognosis.—The prognosis is bad; recovery has taken place only in rare instances. Death may occur in from two days to two weeks.

Treatment.—After a brisk purge warm baths should be given and sodium salicylate should be administered in 10 to 20 grain doses in water

per rectum, three times a day. Sedatives and stimulants may be required. Salvarsan should be tried, also Flexner's serum and convalescent poliomyelitis serum.

Congenital Spastic Paralysis

(*Spastic Paraplegia—Little's Disease*)

This condition is, as its name indicates, a spasmodic paraplegia of the extremities—particularly the legs. Meningeal hemorrhage with compression by the blood clot is the causative factor.

Treatment.—This condition is capable of improvement and cure by general hygienic management and massage and by mercurial treatment, if the Wassermann test is positive.

Surgical Treatment of Various Forms of Spastic Paralysis.—The new treatment of spastic paralysis by resection of the posterior spinal nerve roots has given good results in some cases.

It appears that cases of extreme spastic contractures derive benefit from posterior nerve cutting by having their inordinately stiff, useless extremities changed into more or less flaccid ones. It would be necessary, however, to be very careful in the selection of cases adapted for this therapy.

Resection of the Posterior Roots for the Cure of Little's Disease.[1]—The author is thoroughly convinced that a distinct advance has been made in the treatment of Little's disease through resection of two or three of the posterior roots of a spinal segment controlling certain groups of spastic muscles. Only the severe cases of spasticity are selected for operation, as the mild cases can be treated by simple orthopedic measures. Details of the manner by which spasticity is pathologically produced and relieved by this operation are thoroughly explained. Novocain is injected locally into the spinal canal above the seat of operation, with the result that there is absolutely no shock. The patients must be educated to walk after the operation and tenotomies and plaster casts are necessary to correct deformities. In other words, the same amount of guidance and treatment must be employed as is usually given without operation.

Out of the author's 10 cases, 3 were absolutely relieved of spasticity and were eventually able to walk. In the remaining 7 cases, 5 give every prospect of being ultimately cured. One case, on account of marked atrophy, gave little promise of good results.

Syringomyelia

Syringomyelia is not a very rare disease. It is probably of congenital origin, but it may follow traumatism. It is more common in males before the age of thirty.

[1] Dr. E. N. Blahd, *Lancet Clinic*, March 13, 1915, p. 300.

Pathology.—A growth of embryonal nerve tissue about the central canal of the cord degenerates and forms a cavity filled with fluid. It usually is in the lower cervical and upper dorsal region, but may extend the entire length. According to the degree of extension we observe the symptoms.

Symptoms.—The symptoms begin insidiously at about puberty and extend for years. Aching pains in the neck and arms are followed by muscular atrophy, first in the hands, then in the arms and trunk. The loss of sensations of temperature and pain, while those of touch and location are retained, is almost pathognomonic. The legs become involved late in the disease and show a spastic paraplegia. Curvature of the spine usually results from involvement of the spinal muscles. Cyanosis, edema, sweating, ulcers, bullae, defective growth of the nails, and brittleness of the bones result from the vasomotor, secretory, and trophic disturbances. Felons may arise. If the lumbar cord is involved, there is loss of control of the sphincters.

Diagnosis.—We distinguish the disease by the sensory pathognomonic signs (loss of the senses of temperature and of pain, retained touch and location sensations) and the combination of an amyotrophic paralysis, and progressive muscular atrophy of the Aran-Duchenne type.

Prognosis.—The prognosis is bad. The disease extends over years. In the later stages the disease resembles chronic muscular atrophy. Death may result from involvement of the medulla.

Treatment.—The treatment is symptomatic. It is important, then, to warn patients suffering with beginning syringomyelia of the necessity of taking the greatest possible care of the affected member, in order to avoid the accidents to which it is liable because of the disturbed sensory condition of the part. Gland therapy should be tried.

Poliomyelitis

Infantile Spinal Paralysis—Heine-Medin's Disease

Definition and Modes of Transmission.—This disease, which occurs sporadically and in epidemics, is most frequent between the ages of one and four years and may be looked upon as a systemic or general infection with organisms having an elective affinity for the central nervous system. Recently Flexner has identified a very minute microörganism in connection with poliomyelitis. As early as 1909, however, a living virus was demonstrated by means of inoculations from the spinal cord of patients into monkeys, causing the disease; later secretions from the nose and throat of patients, and even persons in contact with them, were used successfully for the same purpose; also the intestinal secretions of patients have experimentally been found to contain the virus. *Thus it is fairly well established that the virus of poliomyelitis can be expelled from the infected*

human body in the secretions of the nose, throat and intestines, and may leave the body of contaminated healthy persons in the same way.

Conveyance by Animals, Poultry and Insects.—The paralytic diseases with which animals are frequently afflicted differ from infantile paralysis. Experimental studies have excluded ordinary domestic animals from being carriers of poliomyelitis.

Blood-sucking insects and flies have not as yet been proven to be carriers, but are under suspicion.

Chronic Human Carriers.—Flexner reports an undoubted instance of the human disease in which the virus was detected in the mucous membrane of the nose and throat five months after the acute onset.

Incubation Period and Susceptibility.—As far as is known the incubation period varies from two to fourteen days. Children are by far more susceptible than adults, but not all children are susceptible. Unfortunately we have no test as yet for detecting susceptibility. Insusceptibility is conferred by one attack.

Gross Pathology.—Poliomyelitis in a pathological sense and in paralytic cases is a diffuse interstitial inflammation of the central nervous tissues. The accompanying plate, obtained through the courtesy of Dr. H. Martland, the Newark, New Jersey, City Pathologist, give a comprehensive picture of the autopsy appearance of the cord and brain in poliomyelitis. An analysis of the autopsy findings in 30 fatal cases during the epidemic of 1916, as reported by Dr. Martland, gives the following points:

General Appearance.—Bodies of children from one to five years of age are well nourished; very few appear emaciated, and all show a *peculiar* pallor of the skin.

Brain.—Intense acute encephalitis, the gray matter having a *characteristic* color, ranging from pinkish gray to a scarlet and copper-purplish hue. Meninges free to the naked eye. Lymphocytic infiltration of pia-arachnoid is seen in sections under the microscope. Moderate hydrocephalus in one case out of 30 fatal cases.

Cord.—Active hyperemia is seen on meningeal surface and on cut sections. Extensive lymphocytic foci (perivascular and diffuse) are seen throughout the vital centers (medulla and pons) with edema and chromatolysis in the neurones.

Lungs.—In death from respiratory paralysis, parietal and visceral, pleural ecchymoses were found, also acute interstitial emphysema with blebs under the visceral pleura.

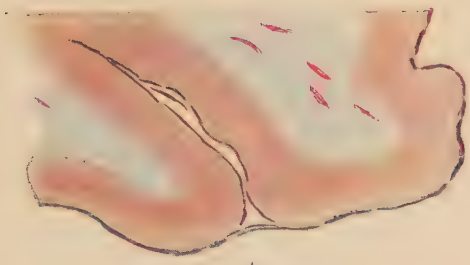
Heart.—Cloudy swelling. Right heart dilated with cloudy blood. Pericardial ecchymoses; occasional endocardial ecchymoses.

Liver.—Cloudy swelling.

Kidneys.—Cloudy swelling. Toxic and degenerative tubular nephritis.

Lesions Which Would Suggest Portals of Entry of Germ.—

PLATE



A

A. Section of Cerebral Cortex; Normal (Schematic).

Note: Gray color of cortex, supposed to be about normal.

B. Section of Cerebral Cortex; Case of Heine-Medins Disease (Schematic).

Note: Reddish, scarlet and purplish red color of cortex (acute encephalitis), active hyperemia and edema.

This quite characteristic color we have only seen in cases of poliomyelitis, rabies, tetanus, heat-stroke and occasionally in the so-called traumatic encephalitis.

B

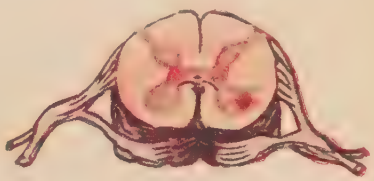
C

C. Section of Human Cord; Normal (Schematic)

Note: Color of gray matter and white matter. The color is supposed to be near normal.

D. Section of Human Cord; Case of Heine-Medins Disease (Schematic).

Note: H is pink to red in color. Hyperemic spots in anterior horn and mid-zone; characteristic location for these so-called hemorrhages; active hyperemia and edema of white matter.



D

E

E. Section of Human Cord; Case of Heine-Medins Disease (Schematic).

Note: H is pink to red in color. Hyperemic spots in mid-zone and in Clarke's column in posterior horn; also characteristic location for these so-called hemorrhages. Active hyperemia and edema of white matter, especially along margin of lateral columns.

POLIOMYELITIS

(Courtesy of Dr. H. Maitland, City Pathologist, Newark, N. J.)

Intestines.—Small; pinkish hyperplasia of Peyer's patches and solitary follicle with pinkish hyperplasia of mesenteric glands.

Colon.—Follicular colitis with hyperplasia of solitary follicles.

Mucosa.—Nasal and tonsils in cases examined were quite free and clear; also throat mucosa.

Statistical Summary of 580 Cases Admitted to Newark City Hospital During the Epidemic of 1916; Service of Dr. Daniel Elliott and Dr. Whitenack, and reported by Dr. Elliott:

Cases Admitted to City Hospital: July 4th to 24th, 5; July 24th to September 2, 570; September 2 to 18th, 5; total, 580 cases; largest number in hospital at one time, 435.

Sequence of cases in one family occur in three families; all the other cases were single cases from a family.

Mortality: Total number of cases observed, 580; discharged, 438; died, 142; mortality percentage, 24.47 per cent.

Age: Largest number of cases in second and third years; youngest, 3 months; oldest, 40 years.

Number of adults, 13; died, 5; recovered, 8 (seven with extensive paralysis probably permanent); nursing babies, 35.

Results on Discharge: Percentage of cases not paralyzed on discharge, 44 per cent; paralyzed on discharge, 46 per cent.

This includes mild paralysis like squint, facial, torticollis, etc., and severe forms, with one or both arms, one or both legs or all four extremities; ten cases were unable to move at all when discharged; 30 per cent of those paralyzed were improving at time of discharge; some manifested only slight muscular weakness; 30 per cent of those paralyzed were in the lower extremities; 16 per cent were in the upper extremities.

Relapses: Relapse cases, 12; died, 6.

These occurred after some three weeks and were generally ushered in with a rapid rise of temperature and respirations. Some of the older cases complained of intense headache. In all these cases a strict search was made for any other factor to explain the occurrence. The relapses occurred in the paralyzed and non-paralyzed cases, the relapse was of short duration in those dying (from three to twenty-four hours), while in those that recovered it was about three weeks. It was in these cases that the second lumbar puncture relieved the headache.

Clinical Types of Poliomyelitis.—A self-explanatory classification of the various manifestations of the disease is that of Wickman, of Stockholm, which is as follows:

1. Ordinary spinal paralysis (anterior poliomyelitis).
2. Progressive paralysis; usually ascending—less often descending (Landry's paralysis).
3. Bulbar paralysis (Polio-encephalitis of pons).
4. Acute encephalitis; giving spastic mono- and hemiplegia.

5. Ataxic type.

6. Meningitic type; to be distinguished from meningitis by appearance and character of spinal fluid.

7. Multiple neuritic type.

8. Abortive type; 25 to 56 per cent not followed by paralysis. In the present state of our knowledge a positive diagnosis in this type is difficult.

Early Symptoms and Diagnostic Points.—During an epidemic, fever (101°-105°), irritability and hyperesthesia are suspicious. Slight rigidity of neck, jerky movements and fine tremors of fingers and hands are very suspicious. The pulse rate is generally high (120-160). Pain in the muscles of the back, legs and arms, and on handling is complained of. Stiffness of neck and back is usually present. Flexion of the head forward produces pain. Headache and sore throat are frequently noted; also vomiting and diarrhea. Rapid breathing, Kernig's sign, loss of knee jerk, polyuria, drowsiness, occasionally convulsive seizures and marked prostration are noticed.

Spinal puncture for diagnostic reasons is of value in doubtful cases. In poliomyelitis the spinal fluid is clear or has a ground-glass appearance and foams when shaken. A laboratory examination shows an increase of lymphocytes, of albumin and of globulin, and a reduction of Fehling's Solution.

Paralysis.—Paralysis may come on early or may be delayed for several days. One or both sides may be paralyzed at the onset, but after a few months, even without treatment, we find paralysis limited to a few muscles of one leg or arm. The muscles become flabby and atrophic and the tendon reflex is diminished or lost. In some cases the bladder becomes paralyzed and the urine must be drawn by catheter.

Differential Diagnosis.—During an epidemic doubtful cases are a constant source of alarm. Before the onset of paralysis, cases may be mistaken for many other acute infections and vice versa.

The cardinal tests and symptoms to be relied upon apart from the spinal puncture test are:

Kernig's sign
Stiff neck
Spinal rigidity
Spinal tenderness and pain
Impaired reflexes
Tremors
Rapid breathing
Polyuria.

In the presence of an epidemic the physician will frequently be called upon to differentiate between poliomyelitis and pseudo-paralysis in scurvy and rickets, tetany, tuberculous and cerebrospinal meningitis, meningis-

mus, cyclic vomiting and acidosis, diarrhea and vomiting, facial paralysis, peripheral neuritis, luetic pseudo-paralysis, uremic coma or eclampsia, hysteria.

Paralysis of the laryngeal muscles may simulate croup, and paralysis of the diaphragm may give symptoms of bronchopneumonia. Brain abscess has been mistaken for poliomyelitis.

In all doubtful cases a careful inquiry as to the mode of onset, the routine search for cardinal symptoms, and an examination of the spinal fluid will elicit a correct diagnosis in the vast majority of cases.

Prognosis.—Prognosis is uncertain. The mortality varies from 10-25 per cent; a high mortality prevails in epidemics. Medullary involvement with respiratory failure is usually fatal. If the patient survives the tenth day the prognosis as to life is favorable excepting in relapse cases which give a high mortality. The early return of faradic contractility gives a favorable outlook as to muscular efficiency.

Prophylaxis

Patients should be isolated and handled as in the case of any other contagious disease (*see* Sections I and III). Since the virus of poliomyelitis can enter the body through the mucous membrane of the nasopharynx and perhaps through the gastro-enteric tract, well children can be safeguarded during an epidemic by means of: the nasopharyngeal toilet (*see* Section 1), screening of porches and living rooms, excluding animals and pets, boiling the milk, stewing all fruit.

The radical way to prevent children from contracting the disease is to quarantine them against possible carriers. The value of prophylactic injections of convalescent serum is not as yet established.

Persons in contact with poliomyelitis should wear a gauze mask impregnated with Labarraque's Solution over mouth and nose.

The period of quarantine for those who recover from the disease is three to six weeks, during which time the nasopharynx should be treated as in the case of diphtheria carriers, and urine and stools should be disinfected.

New Procedures and Regulations re Poliomyelitis, Department of Health, New York City [1]

In order to bring its procedures and regulations for the control of poliomyelitis into harmony with the suggestions recently made at the Conference of State and Provincial Boards of Health of North America, the Department of Health has adopted the following revised procedures effective at once:

Incubation Period:

The incubation period of the disease is established at two weeks. The quarantine period of children under sixteen years of age who have been, but no

[1] *Weekly Bulletin, Dept. of Health,* June 16, 1917.

longer are, exposed to infection, will be fourteen days from the date of last exposure as determined by the Department.

Quarantine:

(*a*) An official printed notice of the period and requirements of quarantine in this disease will be prepared, in several languages, for formal, legal service upon the parent, guardian or other person responsible for their observance, whenever the patient can be isolated in the home.

(*b*) The patient, whether at home or in hospital, shall be isolated for three weeks from the date of onset of the disease, as determined by this Department, and may then be released from quarantine provided the temperature is normal and discharges from the nose and throat have ceased.

(*c*) Children under sixteen years of age (except those who have had the disease) who remain at home in families in which poliomyelitis has occurred, shall be quarantined in the home until two weeks after the termination of the case by death, removal or recovery.

(*d*) Adults of the household, if the patient is isolated at home, may continue their vocations provided this does not bring them into contact with children under sixteen years of age and provided they are not engaged in the preparation and handling of foods.

(*e*) Adults excluded from their usual occupations and children under sixteen years of age affected by the preceding regulations, provided they remove to, and remain at, a different place of residence and are well at the expiration of two weeks from the date of their last contact with the patient, may resume their usual occupations.

Placards:

All premises where a case of poliomyelitis occurs shall be placarded (the only exceptions being hotels and boarding houses, provided the patient is at once removed to a hospital and the room or rooms immediately disinfected and provided no quarantined children remain on the premises). In private houses and in two-family houses with separate entrances, a placard shall be placed on the door entering the room the patient occupies. In apartment and tenement houses a placard shall be posted on the door of the apartment occupied by the family of the patient. In two-family houses with a common entrance, one placard shall be placed on the door entering the portion occupied by the family of the patient, and one upon the room or rooms occupied by the patient.

Removal to Hospital:

No patient shall be left at home unless the following conditions are complied with to the satisfaction of the Department:

(*a*) There must be a physician in frequent attendance.

(*b*) The patient must have a special attendant, who must obey quarantine regulations and must not do any housework, marketing or perform any household duties for other members of the family. The attendant may, however, leave the house provided the necessary precautions as to personal disinfection are observed, but all children must be avoided.

(*c*) The patient and the attendant must have a room, or rooms, separate from the rooms of others in the family.

(*d*) All the windows of this room must be screened and all flies in the room killed.

(*e*) The family must have a separate toilet for its exclusive use.

(*f*) Isolation and quarantine regulations must be strictly observed by the patient and the other children of the family.

(*g*) All discharges from the nose, throat and bowels of the patient and all articles soiled therewith shall be promptly disinfected, and attendants shall wash their hands with soap and hot water promptly after handling such discharges or articles.

(*h*) Attendants shall, in the same manner, wash their hands and change their outer clothing before leaving the room occupied by the patient.

(*i*) All eating utensils and personal and bed clothing shall be properly disinfected.

Requirements for Physicians and Nurses:

Physicians and nurses in attendance upon a case of poliomyelitis must use every precaution to avoid being soiled by discharges and by droplet infection from the patient, and their hands must be thoroughly cleansed with soap and hot water before leaving the premises.

Terminal Disinfection or Renovation:

After removal, recovery or death of the patient, disinfection or complete renovation of the room or rooms occupied by the patient and attendant is required, and after recovery of the patient, isolation shall be terminated by a thorough washing of the entire body and hair of the patient.

Medical Inspectors:

All cases and suspects reported by physicians, nurses, social workers and other citizens, will be visited at once by a diagnostician of the Department. This procedure will prevail even when the case is reported by a physician who requests that it be admitted to hospital.

The janitor or his representative must be seen in every instance at the time of the diagnostician's first visit and notified that he or she will be held responsible personally by the Department for the quarantine of children in the family premises, and for the prevention of defacement or removal of placards.

If the inspector makes or confirms the diagnosis of poliomyelitis, the Borough Office of the Department is to be notified by him and by it the ambulance is summoned, if removal is indicated. In every case the inspector must leave the "Hospital Admission Slip" properly and fully filled out. When a case may be left at home, the inspector must give full instructions to the family, and serve the quarantine notice upon the parent, guardian or other responsible person.

All cases of questionable diagnosis must be seen at once in consultation with the Borough or Chief Diagnostician, and whenever it is required, spinal puncture will be made and a laboratory report submitted by the staff of the Research Laboratory. Cases with positive laboratory findings will be considered as poliomyelitis regardless of clinical signs. A full history must be recorded on a special card (Form 316-V) for each assignment covered by Inspectors.

Nurses:

Nurses will visit every case reported, to instruct the family regarding isolation of the patient and quarantine. Every other family in the house will be warned by her, as follows:

(*a*) That there is a case of this disease in the house.

(*b*) That the other children of the family in which the disease has occurred will be quarantined, and, should they fail to observe quarantine, that fact should be immediately reported to the Department of Health, in order that steps may be taken to enforce it.

(*c*) Regarding home cleanliness, personal hygiene, the danger of infection by flies, and other general measures which should be taken to prevent infection.

(*d*) To report at once to the Department any cases of suspicious illness of children, or any cases of poliomyelitis, especially if there is no physician in attendance.

A current history (Form 304-V) must be kept by the nurse for every case, giving dates of visits, action taken and the date and mode of termination.

Nurses must see the janitor or his representative at their first visit, and repeat the instructions given by the Diagnostician.

Patients isolated at home and families with quarantined children will be visited daily by a nurse or patrolman for the maintenance of quarantine, and oftener if necessary. After removal, recovery or death of the patient, nurses will issue "Renovation Notices," following these up by visits until they are complied with.

Sanitary Police:

These officers will visit quarantined premises frequently—daily, if necessary —to enforce isolation of the patient and the quarantine of the other children in the family, and to affix or replace placards. They will serve summonses when the regulations of the Department are violated and will appear in court, if necessary.

Ambulance Surgeons:

All cases ordered removed to a hospital must be removed by the ambulance surgeon without question, with the following exceptions, in each of which the ambulance surgeon must first obtain telephone authorization from the Resident Physician of his hospital, to leave the case at home:

(*a*) When removal would endanger life of child (bulbar cases).

(*b*) When the family physician can show that requirements will be met at once (or within 12 hours).

Doubtful and mixed infection cases must be removed by themselves in a separate ambulance.

In every case ambulance surgeons must leave a card with parents, giving name and address of hospital to which patient is taken. If the inspector has not left "admission slip," the ambulance surgeon must make out this slip.

Hospitals:

The desirability of prompt removal of poliomyelitis cases to hospitals having been determined, these cases should receive precedence over all others except croup. All removals are to be made primarily to the hospitals of the Department.

If it is found necessary to borrow ambulances, a representative of the Department of Health, either physician or nurse, must accompany each ambulance.

No patients are to be ordered removed to the hospitals except by diagnosticians of the Department.

The capacity of the hospitals of the Department is to be maintained where necessary by the immediate transfer, by departmental ambulances, of patients to other hospitals; where possible, only to hospitals in the borough of residence of the patient. Notification of such transfers is to be sent by the hospital to the parents, stating the destination of such transferred patients. Where discharged patients need transportation, arrangements should be made before they leave the hospital for conveyance other than public conveyance.

A notice of all discharges, transfers and deaths must be made promptly to the respective borough offices of the Department.

Physicians and nurses who are on duty in attendance upon poliomyelitis

patients in the hospitals are to be considered as contacts, and are not to be allowed upon other services of the Department.

No specific or experimental procedure for treatment of poliomyelitis cases is to be undertaken in Department hospitals, without the approval of the attending physician on duty.

Each case may be visited twice during its stay in the hospital, by a parent or guardian. If a child is critically ill, the guardian or parent will be notified and will be permitted to visit daily, while the child is dangerously ill. Information relative to its condition will be given out at the Information Desk in each hospital, or by telephone in response to a telephone inquiry from the parent or guardian.

Return of Poliomyelitis Patients to New York City:

In cases where poliomyelitis occurs in residents of New York City who are temporarily residing outside the city, the disease developing within two weeks of the time of leaving the city, the patients will be permitted to return, provided (*a*) a private conveyance (private car, private automobile, carriage or ambulance) is used, and (*b*) the patient goes direct to a hospital authorized by the Department of Health to care for cases of poliomyelitis.

Return of Children Who Have Been Exposed to Poliomyelitis to the City:

New York City children under sixteen years of age, temporarily outside of New York City, who have been exposed to infection with poliomyelitis within two weeks, may return to the city under the following conditions:

(*a*) They must come by private conveyance and must go direct to their homes.

(*b*) Advance notice of their coming must be sent, and authorization from the Department of Health must be obtained by telephone by the Local Health Officer. Such notice must give the name and age of each child, together with the verified address, including the floor, and the latest date of exposure to infection, and must be followed immediately by a written notice.

Such children will be promptly visited at their homes by a representative of the Department of Health, and their parents or guardian instructed as to the nature and duration of quarantine. They must not leave the premises until two weeks have elapsed from the date of last exposure to infection.

The premises will not be placarded, but the children will be visited at regular intervals, and should quarantine be violated the parents or guardians will be summoned to court.

Treatment

Direct Local Treatment.—*Convalescent and normal human* or animal *blood serum* has been injected into the spinal canal as a curative procedure in a number of cases before and during the epidemic of 1916. In the writer's opinion the therapeutic value of this form of treatment is not as yet established. Rosenow's serum therapy is in its experimental stage.

Adrenalin injected into the subarachnoid space does not appear to have curative value.

Spinal puncture for the purpose of removing cerebrospinal fluid under pressure, is not a curative procedure but will probably ameliorate severe headache and great unrest if present.

General Symptomatic Management during Acute Stage.—As in the

case of acute febrile ailments in general, the patient should have an enema, a warm mustard bath at about 102° F., and should be put to bed in a well-ventilated room.

A liquid diet with plenty of cool water to drink is indicated, and a few drops of dilute muriatic acid in orange or pineapple juice may be given three times a day, and the nasopharyngeal toilet should be carried out. (*See* Section I.)

To further elimination, warm baths may be repeated at intervals of six hours. Gentleness in handling the sick child is important; therefore it is best to lower the patient on a sheet into the bath.

With the hope of arresting the progress of the infection the following drugs may be given:

Urotropin, gr. iii, by mouth 3 times a day. Aspirin, gr. ii-iii, by mouth 3 times a day. Sodium salicylate, gr. v-x, 3 times a day.

If the patient cannot swallow, feeding by gavage must be practiced.

In urinary retention the catheter is to be employed.

Frequent vomiting is best controlled by drop doses of tincture of iodin in sugar water every hour.

In restlessness 5 to 10 grains of bromural or of sodium bromid twice a day are indicated. In exceptional cases gr. 1/48 to gr. 1/16 of morphin sulphate may be given by hypo.

In severe headache and irritability one or more lumbar punctures will ameliorate these symptoms, also an ice bag may be put to the head. *Circulatory failure* and *collapse* are counteracted by hypodermatic administration of 5 to 20 drops of a 20 per cent solution of camphor in oil every four hours.

Bed rest is to be enforced as long as tenderness persists, and weakened extremities are to be supported in bed by sandbags.

Management during Convalescent Stage (*period of two years*).—Paralyzed limbs are cold and should be well protected. For the prevention of deformity it is essential to immobilize them by means of sandbags, splints and plaster bandages, as emphasized by Lovett of Boston since the epidemic of 1916. After all tenderness has disappeared, the patient may attempt the upright position with or without braces, but not to the point of fatigue, and from then on the judicious application of hydrotherapy, heat, friction, massage, passive motion, vibration and electricity is indicated for at least two years.

Muscle training may be practiced before a mirror, so as to enable the little patient to concentrate his mind more readily on the affected muscles.

Management during the Chronic Stage (*at least two years after the onset*).—Surgical treatment such as tendon transplantation and nerve anastomosis has given good results in many cases.

Infantile Cerebral Paralysis

(*Acute Polioencephalitis*)

Infantile cerebral paralysis begins more or less with brain manifestations, fever, delirium, spasms, convulsions. The paralysis is usually of the hemiplegic type, with rigidity, contracture, and exaggerated reflexes. In some cases posthemiplegic chorea and athetoid movements are noted, but there is no extreme wasting.

Encephalitis leaves a high percentage of nervous and mental symptoms. Prevention and treatment are about the same as in poliomyelitis.

Fig. 160.—Cerebral Infantile Paralysis. Right Hemiplegia. (After Strümpell, "Text-book of Medicine.")

Anterior Poliomyelitis in Adults

(*Landry's Paralysis*)

Anterior poliomyelitis in adults occurs more often in men than in women. The etiology and pathology are the same as in children, except that the onset is less acute; the cranial nerves may be involved in some cases; rheumatoid pains may be present and are referred to the affected muscles and joints; muscular tenderness may be extreme; fewer muscles are affected.

Prevention and treatment are the same as in the infantile form.

Locomotor ataxia

(*Tabes dorsalis—Posterior Spinal Sclerosis*)

Etiology.—Males are affected with this disease about ten times as often as females. It is most common between the ages of thirty and fifty. Syphilis precedes the diseases in over 90 per cent of the cases.

Pathology.—Briefly, it may be stated that there is a degeneration of the posterior roots of the dorsal columns of the cord. Sometimes the spinal ganglia and peripheral nerves are affected.

The **symptoms** are usually divided into four stages: the stage of pain, loss of tendon reflex, the stage of ataxia, and the stage of paralysis.

Stage of Pain and Loss of Tendon Reflex.—Pain occurs in 90 per cent of the cases. It is of a paroxysmal, darting character, bilateral, extending down the legs, and generally referred to the deeper structures. The pains are lightninglike in character, irregular in distribution, seldom or never corresponding to nerve trunks, and there is no local tenderness. Sometimes the pain is diffused and superficial, and the patient may have a sensation of extreme heat or cold. When the lesion extends to the cervical region of the cord, there may be lightning pains in the arms. In a few cases where optic atrophy is one of the first symptoms the pain may be absent or slight. In these cases the ataxia is not apt to develop. Occasionally there are trophic disturbances.

Paresthesia.—In this pain stage there are sensations of numbness, formication, dead extremities, cotton or pins in the soles of the feet and the fingers, coldness, and itching of the anus, scrotum, and other parts. There is a sensation of tightness or pressure around the waist, the girdle sensation, which ascends gradually as the disease advances.

Westphal's symptom, loss of the knee jerk, is one of the earliest symptoms and one which is seldom absent. If it is associated with lightning pains and the ocular symptoms, we have a symptom group absolutely diagnostic of locomotor ataxia.

Bladder and Rectum Symptoms.—There is imperfect control of the bladder. There is slow urination, with slight dribbling, or hasty urination may be seen. Later, the control is very imperfect and micturition may be very painful. Cystitis may occur and it may be a serious symptom, as it sometimes results fatally. Impotence is usual, but previously there may be priapism and disordered sexual excitement. Constipation is usually obstinate.

Eye Symptoms.—There may be ptosis, strabismus, double vision, or in rare cases ophthalmoplegia externa. The *Argyll-Robertson pupil,* a symptom present in this stage in 80 per cent of the cases, is the loss of the pupillary reflex to light, the reaction in accommodation being preserved.

Contracted pupil, *meiosis spinalis,* is frequent but not constant.

Stage of Ataxia, Anesthesia, and Analgesia.—The sense of pain is impaired and delayed, which prevents the knowledge of injuries received, so that such symptoms as *ulcer of the foot* and *Charcot's joints* occur as complications. We should guard against accidents and neglect of injuries, as in giving hot baths, etc.

Hyperalgesia.—The sensation of pain may be severe simply from a touch. There is a change in the sensation of temperature, cold being felt keenly and heat less than normal. Late in the disease, there is a development of complete anesthesia in the extremities.

Impairment of Muscular Sense.—The situation of the limbs is imper-

fectly perceived, so that, as it is normally a means of perfect guidance, its absence causes the patient to walk badly in the dark, to be unable to touch objects accurately with the eyes closed, and to watch his own motions, aiding his muscular sense by sight. A blind ataxic is a most helpless person. *Ataxia,* or imperfect coördination of muscular action, is a prominent symptom. The ataxic gait is that in which the legs are held too far apart, the feet are lifted too high and put down too forcibly, the steps are of irregular length, and the body is imperfectly balanced. The hands cannot be perfectly controlled, as in writing, dressing, and the finer movements. There is an irregular contraction of the muscles and there is imperfect tone in them. To test the ataxia, we ask the patient to stand with his eyes closed and walk, turn suddenly or walk backward, to touch the heel to the toe or the heel to the knee, to touch the finger to the nose, to pick up a pin, etc.

Symptoms occasionally present are those due to neuritis of different nerves. Progressive blindness due to atrophy of the optic nerve is present in about 20 per cent of the cases. Paralysis of the third cranial nerve causes divergent strabismus, with dilated pupils and ptosis. Nystagmus rarely occurs. Paralysis of the sixth nerve causes convergent strabismus with contracted pupils. Atrophy of the auditory nerve gives rise to deafness.

Crises.—1. Gastric crises, sudden vomiting with pain, may occur at intervals lasting from several hours to several days. It is followed by great prostration, and may make nutrient enemata necessary. Intestinal and rectal crises with diarrhea and tenesmus are rarely seen.

2. Laryngeal Crises.—Sudden severe cough with spasm of the larynx and suffocation.

3. Cardiac Crises.—Attacks of angina pectoris are rare. These symptoms are all due to a complicating neuritis of the pneumogastric nerve, and are not very common. In this stage, trophic disturbances are more common.

Charcot Joints at the Knee, Elbow, Ankle, and Wrist.—There are swelling and effusion without pain. There may be erosion of the ends of the bones and destruction of the articulation. Injury precedes these joint lesions. The condition known as *perforating ulcer of foot* may develop from neglect of a corn, a subcutaneous hemorrhage, or caries of bone. Rarefaction of bones, with spontaneous fractures, may occur. Irregular muscular atrophies may develop late in the disease. Herpetic eruptions and pemphigus may occur. These symptoms are largely due to a loss of the sensation of pain, which prevents knowledge of injuries, or to a peripheral neuritis.

Stage of Paralysis.—Although the general nutrition remains good, the ataxia becomes so bad as to make the patient helpless, and he is obliged to keep to his bed. The control of the rectum and bladder is lost, the urine dribbling constantly. The trophic disturbances are more marked, and also

injuries from accidents. Patients die therefore from bedsores, cystitis, exhaustion, or complicating pneumonia. Fatal asphyxia may result from a laryngeal crisis or aspiration pneumonia due to anesthesia of the larynx. The disease is chronic and lasts from twenty to forty years. Ataxia is rarely developed until from five to eight years after the beginning of the disease. Recovery hardly ever occurs, but arrest of the disease may take place at any time, particularly during the first stage.

Modes of Onset.—The most usual beginning is with pain, loss of knee jerk, bladder trouble, impotence, and ataxia. Occasionally it may begin with blindness, loss of the knee jerk, imperfect gait, and numbness, but no pain; or with gastric crises, at intervals, loss of the knee jerk, and then pain and ataxia; or with various forms of strabismus, meiosis, and then ataxia of the arms.

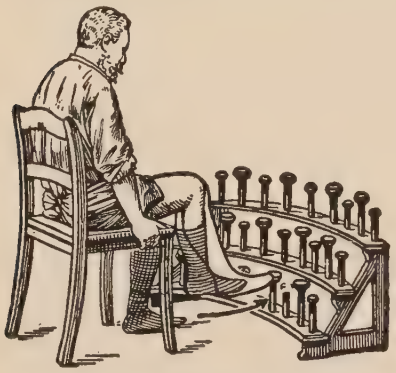


Fig. 161.—Muscle Reëducation in Tabes. (After Billings-Forchheimer, "Therapeusis of Internal Diseases.")

Diagnosis.—The diagnosis is made early by means of the pains, fatigue, loss of the knee jerk, and the Argyll-Robertson pupil. Later we make it from the presence of ataxia and bladder trouble. Multiple neuritis is sometimes confounded with tabes, but its onset is rapid, paralysis occurs early, control of the bladder is present, and there is no Argyll-Robertson pupil. In the majority of cases of tabes the Wassermann test is positive.

Treatment.—There should be ordered moderate exercise, but avoidance of all fatigue. The diet should be full and good. Douches over the spine of tepid or cool water (never at extremes of temperature) are helpful. The patient should have massage and try to overcome the ataxia by practicing fine movements. The pain may be treated with the coal tar products, gelsemium, opium, faradization, and hot applications; the crises with counterirritation and morphin. Care should be observed not to injure the patient by counterirritation or hot applications, as trophic disturbances are likely to follow. Optic nerve atrophy should be treated with strychnin. The trophic disturbances are best met with rest and apparatus.

Antiluetic Treatment in Tabes.—In all cases of tabes, in which an examination of the blood or spinal fluid gives a positive Wassermann reaction, salvarsanized or mercurialized blood serum should be administered intraspinally (*see* Syphilis).

Electricity.—The galvanic current of medium intensity may be given from three to five minutes daily, one pole being placed upon the neck or between the shoulders and the other upon the lumbar region.

The galvanic brush is applied to painful areas. *Suspension* by the head

and arms from a gallows, for one to three minutes daily, is said to have had good results in a number of cases.

Muscle-Reëducation in Tabetic Ataxia.—To relieve the ataxia, Fränkel's method of training should be recommended. It consists in attempts to follow a line or geometrical figures, after which further motions should be attempted, such as walking upstairs, etc. Apparatus, such as is employed for physical exercises, is not used.

These patients are taught certain movements just as we teach dancing, riding, etc., by a simplified instruction as to different movements, by splitting up different movements into their elements. They must know not only in general, but in particular, the various phases of those extremely complicated processes in walking and standing. The duration of treatment is one-half an hour daily.

FIG. 162.—MUSCLE REËDUCATION IN TABES.

Exercise treatment of tabes will overcome ataxia, but has no influence on the central lesion. It is best given in institutions. No special skill, however, is required to train tabetics to overcome their ataxia—any physician can do it in the office or home and a few mechanical aids can be improvised.

As the tabetic does not feel fatigue readily, he must be watched to stop short of fatigue, as this would weaken the muscles. The exercises benefit even in the severest cases, as a rule, and decided improvement can be counted on in fifty per cent of all cases. The exercises can be done in bed or on the sofa at first. Five to fifteen minutes is usually long enough for the sitting, but it should be repeated two or three times a day. It may be necessary to support the limb at first or suspend it in a sling to permit the patient to make the volitional movements. A straight, zigzag or spiral chalk mark on the floor to follow, or a book or cigar box to step over may prove useful exercises. The aim should be to train the patient in the movements needed in daily life—walking, climbing stairs, writing, buttoning garments and any other movements which may suggest.

FIG. 163.—MUSCLE REËDUCATION IN TABES. (After Billings-Forchheimer, "Therapeusis of Internal Diseases.")

Cerebrospinal Sclerosis

(*Multiple or Disseminated Sclerosis*)

This is a rare chronic disease, affecting the brain and spinal cord together.

Pathology.—There are regions scattered throughout the entire nervous system where sclerotic connective tissue replaces the normal nerve elements.

Etiology.—The cause is obscure. It usually is a sequel of the infectious diseases—measles and scarlet fever in particular—and is found most frequently in young persons.

Symptoms.—The onset is slow and the disease is chronic. Headache, vertigo, malaise, mental irritability, inattention, imperfect memory, lack of self-control, and inability to work gradually develop. Later there develops a tremor of the hands, increased by the effort to hold them still, and finally there is a general intention tremor. The legs early become weak and stiff, and finally a spastic gait develops. The knee jerk is increased. Nystagmus and "scanning speech" (slow, each word separately enunciated without variation in tone) are observed. Optic atrophy is rare. Dementia, attacks of epilepsy, and hemiplegia may finally occur.

The course is very irregular, and the symptoms may disappear for months and then return. The patient dies from some other disease or finally becomes bedridden.

Diagnosis.—The diagnosis is made from the intention tremor, scanning speech, and nystagmus. The reflexes are exaggerated.

Treatment.—No known treatment seems to prevent the progress of the disease. Glandular preparations and salvarsan should be tried.

Neuritis

Etiology.—Ordinarily, neuritis, an inflammation of nerve substance, involves a single nerve, but it may involve a plexus. Injuries, strains, pressure, compression, rheumatism, gout, infection, and occasionally the various toxins, as described under Multiple Neuritis, may affect a single nerve.

Symptoms.—The muscles supplied by the nerves involved show weakness or paralysis with atrophy and the reaction of degeneration. The skin of the region of the diseased nerve is numb or anesthetic. Vasomotor and trophic changes, such as coldness, glossy skin, and edema, are present. There are pain and tenderness at the point of inflammation.

Course.—When the continuity of the nerve is preserved, there is slow and spontaneous recovery. Otherwise there is no recovery.

Treatment.—Unite the ends of the broken or cut nerve in injury cases. Rest the injured part, but exercise the muscles which are paralyzed by massage and electricity. Hot applications, sedative lotions, and protection

from the cold by cotton batting are useful. The pain may demand morphin.

Multiple Neuritis

Multiple neuritis is an inflammatory or degenerative disease of the peripheral nervous system. It affects symmetrical parts of the body and varies in different cases in extent and severity.

The **pathology** is the same as in simple neuritis, and the inflammatory changes may be of both types or of either alone.

Etiology.—*Toxic Cases.*—Alcohol, wood alcohol, lead, arsenic, bisulphid of carbon, copper, zinc, mercury, phosphorus, and coal gas are causes. Occasionally we see cases from excessive tea drinking. Ether, naphtha, ergot, and morphin are mentioned as causes.

Cases Caused by Infectious Poisons.—Diphtheria, typhoid fever, scarlet fever, measles, malaria, leprosy, beriberi, grip, smallpox, syphilis, rheumatism, tuberculosis, etc., are causes.

Autotoxic Cases.—Gout, diabetes, the puerperal state, may give rise to the trouble.

Cases with Cachectic Conditions.—Anemia, tuberculosis, syphilis, septicemia, cancer, general malnutrition, or diabetes may be the underlying factors.

Symptoms.—The onset may be acute or subacute with or occasionally without fever. We observe the symptoms of a simple neuritis, but there are different types according to the different causes.

1. Sensory Symptoms.—Sensory symptoms are first to occur. There is sharp, severe pain located in the limbs, both along the nerves and in the muscles, which is increased by pressure or motion.

Paresthesia occurs, such as burning, tingling, numbness, formication, and the sensation of a band about the legs or body.

Anesthesia, symmetrical, in the tips of the fingers and toes, extending up the limbs, is present.

Ataxia is observed in the finer movements, also loss of the sense of position.

2. Motor Symptoms.—*Paralysis.*—This appears in the extensor muscles, and we note dropped wrist or foot, with inability to walk or move about in bed. There may be paralysis of the cranial nerves. Contractures may develop. After the paralysis, atrophy develops rapidly, with loss or change of the electric contractility. There is no incontinence of urine. The deep reflexes are lost.

3. Trophic Symptoms.—With the vasomotor paralysis we see glossy skin, edema, abnormal growth of the nails and hair, profuse sweating, and urticaria. There are no decubitus bedsores.

Alcoholic Neuritis.—Alcoholic neuritis is the most common form, and it occurs more frequently in women than in men. It resembles myelitis.

Symptoms.—The onset is usually sudden, with a chill and fever from 101° to 103°. There are usually delirium and delusions, with, later, an imperfect memory for recent events. The paralysis becomes complete with great pain and dropped wrists and feet. The anesthesia, tremor, and tenderness are marked. In another form all the symptoms of locomotor ataxia, except those of the bladder and rectum, develop rapidly. In either form death may occur from heart failure or exhaustion. However, we usually see a rapid increase of symptoms for three or four weeks, with a period of about two months during which the symptoms remain almost stationary, and then a slow recovery. The disease lasts from six to sixteen months. The combination of anesthesia of the skin with extreme hyperesthesia and soreness of the muscles is highly suggestive of alcoholic neuritis.

Fig. 164.—Alcoholic Polyneuritis with Bilateral Radial and Peroneal Paralysis. (After Strümpell, "Text-book of Medicine.")

Neuritis Following or Complicating the Infectious Diseases.—Diphtheritic neuritis is the most common. The paralysis begins in the uvula and may involve the muscles of the palate, eye, or heart, or be generally distributed in the extremities. There are usually no sensory symptoms. The paralysis is usually in the form of paraplegia. The duration is commonly about three months.

Lead Paralysis.—There is usually a preceding colic, with anemia, constipation, and the lead line on the gums. The onset of the palsy may be abrupt or gradual. It is without sensory disturbances, except rarely, when it may be accompanied with delusions.

The prognosis of lead palsy is good, recovery gradually taking place in about four months.

In *arsenical cases* there is usually a stomach disturbance at first. They resemble alcoholic cases. Paralysis with ataxia, tremor, atrophy, and great numbness, but with little pain, develops. The legs and arms are equally

affected. *The steppage gait* is usually well marked. Recovery, according to the severity of the neuritis, takes place in from two to six months.

In *coal gas neuritis* the disturbance is chiefly sensory and not severe. Numbness remains for a long time in the fingers, hands, and feet.

Epidemic Neuritis, Beriberi, or Kakké.—This is a disease which occurs endemically in northern Brazil, China, Japan, India, the Straits Settlements, and the Malay Archipelago. It is probably due to a micrococcus, and occurs in several types—the acute pernicious, chronic edematous, and chronic atrophic. At times it assumes epidemic proportions. Foreigners in the endemic localities are usually exempt. It is also looked upon as a deficiency disease. (*See* Section IV.)

Gouty Neuritis.—A gouty neuritis is sometimes seen in people who have other gouty manifestations. They develop numbness and tingling, beginning in the feet or hands, and extending upward. The tingling is worse at night. There is weakness of the muscles, and the patient cannot walk far. It never goes on to paralysis or ataxia.

Neuritis of the Musculospiral Nerve.—This produces *"wrist drop"* and inability to extend the last phalanx. The fingers can be only slightly abducted; supination is lessened or lost; the triceps may be involved, weakening the power to extend the forearm. Atrophy may be present, also the degeneration reaction. There may be a swelling over the tendons of the wrist, some numbness and tingling, and some anesthesia.

Etiology.—In addition to the usual causes of neuritis, paralysis of the musculospiral nerve is frequently due to pressure on the nerve during sleep and anesthesia, also to crutches, fractures, wounds, and tumors. If it is due to pressure, and the pressure is removed, it lasts but a few weeks.

Neuritis of the Circumflex Nerve.—In such cases it is impossible for the sufferer to elevate the arm or rotate it outward. Atrophy, anesthesia, and sometimes pain are present.

Diagnosis of Neuritis.—We distinguish neuritis from anterior poliomyelitis by the pain and tenderness along the nerves, by the other sensory symptoms, and by the symmetrical distribution of the paralysis; from locomotor ataxia by the rapid onset, the paralysis occurring early, the preservation of control of the bladder, and the absence of the Argyll-Robertson pupil; from myelitis by the absence of bladder and rectum affections, the absence of bedsores, the absence of oversensitiveness of the spine to heat, and the peripheral distribution of the symptoms.

Prognosis in Neuritis.—In the majority of cases it is good. In beriberi there is a high mortality. The recovery is slow. When the heart becomes rapid and the respiration poor, showing an involvement of the pneumogastric nerve, the prognosis is bad.

Treatment of Neuritis.—Enjoin rest in bed, order salicylic acid or the salicylates in the early stages, where there is fever, and make warm applications to the affected limbs by means of packs or baths. After the acute

stage has passed, we employ massage, vibratory stimulation, and warm baths at 100° F. for half an hour, several times a day. Electricity in the form of the galvanic or faradic current may be passed through the nerves and applied to the muscles. Contractures should be avoided by passive movements and proper position of the limbs. Alcohol should not be given, except in the alcoholic cases, where it should be gradually reduced. Iodid of potassium is indicated in lead neuritis. The diet should be nourishing, but well regulated. Iron, quinin, and strychnin are indicated as general nerve tonics. For the pain, we may be obliged during the acute stage to give sedatives (phenacetin or morphin). In the chronic stage give arsenic and urge hydrotherapeutic measures.

In postdiphtheritic paralysis, in addition to general treatment, subcutaneous injections of strychnia (gr. 1/50 twice daily) are indicated. Artificial respiration and feeding by gavage may become necessary (*see* article on Diphtheria).

Divers' Paralysis

(*Caisson Disease—The Bends*)

Persons who work in diving-bells under increased atmospheric pressure are likely to have this disease if they emerge suddenly into the normal atmosphere. The longer they remain in the caisson, and the more suddenly they return to the normal atmosphere, the more likely they are to have the disease. Those unaccustomed to the work are most likely to be attacked.

Pathology.—Small hemorrhages are found in various localities of the body, together with *emboli of free gas in the circulation.*

Symptoms.—The symptoms may appear at once or may not occur for half an hour after leaving the caisson. Usually there are very severe pains in the limbs, the legs are tender to the touch, and there is some loss of motor power. Epigastric pain, nausea, vomiting, headache, and dizziness are likely to occur. Paralysis and anesthesia may rapidly develop in the legs, although the neuralgic pains continue. A temporary loss of consciousness sometimes occurs.

Prognosis.—Convalescence may take place in a few days or be delayed for months, with continuous suffering and paralysis. In severe cases the patient may pass into coma and die in a few hours or days. Atrophic bedsores and cystitis sometimes develop. Permanent paraplegia is occasionally a result.

Prophylaxis and Treatment.—The prophylaxis consists in allowing sufficient time for passing through the lock, where the pressure is reduced. At least five minutes should be allowed for each atmosphere. The workmen should be gradually accustomed to the occupation, and the hours should at first be short. If the symptoms begin, the patient should immediately be put back under a slight atmospheric pressure.

In the acute stages ergot in large doses seems to be of service. In the paralytic stage the treatment is the same as in myelitis.

Pressure Paralyses

Pressure paralyses due to lesions in the spinal cord, and affections of the meninges, such as pachymeningitis externa (acute and chronic), pachymeningitis interna hemorrhagica, pachymeningitis interna hypertrophica, acute leptomeningitis, chronic leptomeningitis, syphilitic spinal meningitis, and hemorrhage, are described under different headings (*see* Meningitis, Tumors, Abscess, etc.).

Muscular Dystrophy Paralysis

Paralysis in connection with progressive muscular dystrophies is described under Diseases of Muscles.

Birth Palsies

These, in a majority of instances, are the result of pressure or injury induced by forceps delivery or in prolonged labor.

Forms.—Erb's paralysis is a familiar type in which the upper arm is involved.

Facial palsy is a type which occurs from pressure of forceps on facial nerve.

Forceps neuritis of the neck is another form.

Cerebral palsy results from intracranial hemorrhage.

Treatment of Birth Palsies.—The treatment consists in the use of friction massage, vibration, galvanic and faradic electricity.

In Erb's palsy, if the infant is seen within a week after birth, an attempt may be made to approximate the lacerated ends of torn nerves by keeping the paralyzed arm in a natural fixed position for a time. Manipulation and electrical stimulation of muscles should be begun early—at about the third or fourth week—and kept up for a long period.

Fig. 165.—Erb's Palsy (Dr. H. W. Frauenthal, New York).

When children come under treatment later in life exercises *before a*

mirror must be employed, with the patient's mind concentrated on the physical effort. The earlier treatment is begun the better the results.

In instances where no satisfactory response to treatment ensues nerve suture, nerve anastomoses, and other surgical therapy may become necessary.

Palsies due to muscular dystrophy are discussed in the section on Disturbances of the Locomotor Organs.

Hysterical palsies are discussed under Hysteria.

Miscellaneous

Pott's paralysis is common in childhood. It may follow disease of the dorsolumbar vertebrae for which orthopedic management is necessary.

Pseudoparalysis in rachitic, scorbutic, and luetic subjects is common. Its treatment is that of the underlying cause.

Paralysis following measles is of the paraplegic type, and lasts about six weeks, usually ending in recovery.

Choreic paralysis is usually of the monoplegic type. It usually responds to massage and hydrotherapy.

Painful pseudoparalysis of young children in arm or leg from a painful twist or jerk is another form of palsy. Recovery is rapid after mild massage.

Apraxia is the inability to convert a direct idea of an action into the corresponding movement.

Disturbances with Loss of Consciousness Predominating

Vertigo

Vertigo, a pathological symptom, is characterized by giddiness, dizziness, or the sensation of lack of equilibrium. When external objects seem to whirl around, it is said to be *objective,* and if the person himself seems to move, it is called *subjective.*

Etiology.—Vertigo is observed in anemia, hyperemia, toxemia, intestinal toxemia, alcoholism, the abuse of tobacco, arteriosclerosis, neurasthenia, epilepsy, and organic brain and spinal cord disease, such as tumor and hydrocephalus. We observe reflex vertigo due to eye strain, gastro-intestinal irritation, acoustic nerve irritation (Ménière's disease), or mechanical causes (swinging and electricity). Fatigue vertigo is frequently observed.

Vertigo may be chronic or nearly so. The severe chronic form is called the *status vertiginosus.* Vertigo is increased by rising or sudden motions and diminished by lying down.

Clinical Forms of Vertigo.—

Auditory vertigo (Ménière's disease). For details regarding this type see works on Otology.

Stomachic vertigo, accompanied by loss of consciousness, is a severe form. It occurs generally in persons whose stomachs are overloaded.

Bilious and lithemic vertigo are vague terms applied to conditions caused by *indigestion*. Dyspepsia, constipation, gout, and disordered stomach and bowel conditions create a toxic state of the blood which irritates the nervous centers. It is paroxysmal, being worse in the morning, is often accompanied by nausea, and is not very severe.

Ocular vertigo denotes refractive errors and inequality of the action of the eye muscles.

Neurotic Vertigo.—The form accompanying epilepsy is described under that head. Brain tumors and acute and chronic hydrocephalus give rise to vertigo.

Neurasthenic vertigo is common. It is generally subjective and not severe, although it may cause much alarm. The attacks are short and may be accompanied by nausea or syncope. There is a form coming on in attacks which resemble seasickness, and they are analogous to other nervous crises. There may be intense vertigo, coming on suddenly, with nausea and faintness, and lasting for some hours. Beyond overwork and excitement, there is no known cause. A form called "stumbling vertigo" is sometimes seen in neurotic individuals. There is a sudden "giving way" of the legs without consciousness of any vertigo. Patients with Graves's disease sometimes have this symptom.

Mechanical Vertigo.—Swinging, whirling, and the movements of a ship, steam car, or elevator give rise to this form of vertigo in some people because of an irritation of the ocular and auditory nerves.

Arteriosclerotic and Senile Vertigo.—Impaired nutrition of the brain, with consequent anemia, may be the result of arterial changes. A weak and fatty heart may cause vertigo.

Diagnosis.—Try to ascertain the cause by noting whether the vertigo is subjective or objective, paroxysmal, or chronic, and whether it is accompanied by ear symptoms, nausea, vomiting, or loss of consciousness. The auditory, gastric, toxic, and neurasthenic forms are the most common. Examine the arteries of elderly people and think of epilepsy in the young.

Prognosis.—Epilepsy and organic disease give rise to the most serious forms. All the other forms can usually be relieved.

Treatment.—The horizontal position, rest, and volatile stimulants are applicable to the attack. Then remove the cause if possible. Give dilute hydrochloric acid in dyspepsia; laxatives in constipation. Strychnia when the pulse is weak. Iron and arsenic in anemia. Order rest for fatigue and exercise in obesity.

Eclampsia—Convulsions with Loss of Consciousness

Convulsions are abnormal and exaggerated muscular contractions occurring in rapid succession. They may be *clonic,* a rapid and alternate contraction and relaxation of the muscles in an exaggerated or irregular way, or *tonic,* a steady and continuous contraction. A *cramp* is a painful tonic contraction of a muscle. Convulsions may be coördinate, when the limbs and body are moved about in a more or less purposeful way. The patient throws himself about on the bed, jumps, strikes, kicks, tears the clothes, etc. There is usually loss of consciousness with convulsions.

Convulsions occur in epilepsy, at the onset of acute infectious disease, especially in children; in hysteria, extension of inflammation of the middle ear, in concussion of the brain, in cerebral anemia, in cerebral hemorrhage, in cerebral syphilis, in general paralysis, in infantile hemiplegia, in meningitis, in sunstroke, after aspiration of pleural fluid (rare), in acute yellow atrophy of the liver, in chronic Bright's disease, in the form of puerperal eclampsia, in uremia, in rickets, in indigestion, in tetany, in hepatic colic, in hydrophobia, in typhoid fever, in tetanus, in alcoholism, in poisoning, and from many other causes.

Convulsions in Children.—Convulsions in children, although only a symptom of direct, reflex, or toxic irritation, are practically treated as a separate affection.

Rachitic, tuberculous, and syphilitic children are liable to convulsions. Long continued and profound malnutrition shows obtuseness of nervous system. Convulsions may be followed by coma, semicoma, rigidity, paralysis. Congenital contractures point to convulsions *in utero.*

Prognosis.—The *prognosis* is governed by knowledge of existing cause. Hemorrhage and death may take place.

Initial convulsions are very different from late manifestations.

In infectious fevers, at the onset, they denote overwhelming toxemia, but do not necessarily involve a grave prognosis. Convulsions at the termination of severe illness usually denote some complication or circulatory failure and are of grave import.

Prophylaxis and Treatment.—If prodromal symptoms arise (twitching, cerebral unrest) the bowels should be cleared and high temperatures reduced by a bath at 90° F.

For the *paroxysm* we give an enema, a warm bath and an ice bag to the head and endeavor to keep the patient very quiet.

Sedatives may be administered per rectum:

Hydrate chloral, gr. 2 to 5; Potass. bromid, gr. 5 to 10; Antipyrin, gr. 5 to 10.

Benzyl benzoate in 2 to 10 drop doses, well diluted, may be tried.

Should the convulsions return, the bath and enema should be repeated. A few drops of chloroform by inhalation may control the paroxysm, or a

hypodermic injection of morphia sulphate (gr. 1/48 to 1/24) may be of service. Oxygen inhalations may be tried.

In convulsions from heart failure stimulate subcutaneously with camphor, strychnin, digitalis and whisky. Ergot will be found helpful. After recovery from an attack treat the predisposing cause. Tap the spinal canal for diagnostic purposes in obscure cases; puncture between the fourth and fifth lumbar vertebrae.

Puerperal Eclampsia

This is an acute derangement which may occur in the pregnant, parturient, or puerperal woman, characterized by clonic convulsions with loss of consciousness and coma. Although the kidneys, liver, and brain, together or separately—particularly the kidneys—show pathological changes of varying and inconstant severity at the autopsy, they are not severe enough to indicate them to be the characteristic lesions of the disease. It is probable that convulsive seizures are caused by some unknown toxic material circulating in the blood (*convulsive bodies*).

Symptoms.—From 70 to 80 per cent of the cases occur in primiparae. As a rule, they do not occur until after the second half of pregnancy, and they become more frequent as pregnancy advances. Twin pregnancies and hydramnios seem to predispose to convulsions.

A convulsion may occur without warning in an apparently healthy pregnant woman, but usually there are premonitory signs, such as albuminuria, edema, headache, epigastric pain (an important sign), and possibly disturbance of vision. It may come at any time, even during sleep. If the patient is awake, the first sign is a fixed expression of the eyes, which soon begin to roll from side to side. The pupils are usually dilated, but they may be contracted. The convulsive movements appear first around the mouth, which twitches and is drawn to one side. The whole face becomes distorted, and the convulsions rapidly extend to the arms, body, and legs. They are usually clonic in character, but sometimes the patient may become rigid in a tonic spasm. The breathing becomes stertorous, the face grows congested and flushed, and the patient foams at the mouth and often bites her tongue. It may last from a few seconds to two minutes, and there is absolute unconsciousness during this time. A condition of coma follows, lasting for a variable time. It may last from one convulsion to another, and the patient may die without recovery of consciousness. If the convulsions are infrequent, consciousness is usually regained after each convulsion.

The *urine* during an attack is markedly diminished in amount and contains many casts and often blood. Occasionally there is complete suppression. Nearly always albumin is present in large amounts, and the urea is greatly diminished. In favorable cases, after the convulsions the urine and urea are increased and the albumin diminished. Usually the urine improves rapidly and in a few weeks may appear normal. There may,

however, be albumin and casts in the urine for months afterward. Death usually results from edema of the lungs, apoplexy, aspiration pneumonia, or a puerperal infection.

Diagnosis.—If the patient has been under observation during her pregnancy, the diagnosis is easy. If she is seen for the first time in convulsions or coma, we have to distinguish the cause from uremia, epilepsy, and hysteria.

Prognosis.—The disease is always serious, being considered one of the most serious of obstetrical complications. The maternal mortality is from 20 to 25 per cent and the fetal is from 33 to 50 per cent. The prognosis seems to be worse in the antepartum and intrapartum cases. It seems to be about the same for primiparae and multiparae. Each convulsion makes the outlook more serious. Death may occur after the first convulsion, and recovery after as many as thirty. If the pulse remains good, firm, and full between the attacks, the outlook is usually good; if it becomes weak, rapid, and thready, it is usually a bad sign, especially if accompanied by high fever. The most serious complications are apoplexy, paralysis, and pulmonary edema, which usually result fatally.

Prophylaxis and Treatment.—From the beginning of pregnancy, a woman should be instructed in regard to the necessity of keeping all the emunctories in perfect working order. The kidneys should secrete freely and much fluid be taken. The bowels should move freely every day. The skin should be kept in perfect order by means of baths and exercise. The lungs should have plenty of fresh air. Exercise is imperative, and walking is one of the best exercises.

The urine should be examined every month for the first six months, and every two weeks after that, until the last month, when it should be examined every week. The patient should notify her physician of headache, disturbance of vision, edema, or epigastric pain. If we find albumin in the urine, we should get a twenty-four hour specimen and ascertain the total amount of albumin and urea. If the urea is normal (20 to 24 grams per diem), and there is a slight amount of albumin, the significance is not important. If there is considerable albumin and the urea is diminished, the patient is in a serious condition. We should now have a twenty-four hour specimen examined daily. The patient should be put to bed and placed on a fluid diet. After a few days she can have soft diet. She should drink a good deal of fluid, such as water, lithia water, peppermint tea, and lemonade. The result of this treatment is usually good. If not, give a saline purge daily and a hot pack or sweat bath daily. If there is improvement, the prognosis is good. If the albumin increases and the urea diminishes in spite of treatment, the prognosis is bad, and labor must be induced.

Stroganoff's Prophylactic Treatment of Eclampsia.—Stroganoff's technic aims to prevent the convulsions by reducing the irritability of the nervous system, obtaining sleep by means of narcotics, removing

everything liable to produce irritation, terminating the pregnancy, if necessary, and watching over the regular action of heart, lungs and kidneys. Morphin and chloral are employed, with chloroform at first until the patient feels the effect of the chloral. In moderately severe cases, 0,015 gm. morphin is given first; in one hour or sooner, 2 gm. chloral; morphin again the third hour; chloral the seventh, and 1,5 gm. chloral again the thirteenth and twenty-first hours. If the convulsions continue, delivery is hastened, but surgical measures are seldom necessary.

Curative Treatment.—When the convulsions begin, chloroform should be given, and then morphin (gr. ¼), to be repeated twice if necessary. Diuresis must be provoked by means of hot packs. A strong cathartic must be given, such as one drop of croton oil in 5i of olive oil. If the patient is unconscious, it can be dropped on the back of the tongue. Place something between the teeth, such as a folded handkerchief, to prevent the biting of the tongue. No food or medicine should be given by the mouth during unconsciousness. Terminate labor as soon as is possible with safety. If the fetal head is low down after dilatation is complete, apply the forceps. If it is above the brim, perform version. If the attack comes before labor has begun, use a steel dilator to make space enough for the Champetier de Ribes balloons. Cesarean section must be considered in desperate cases.

After delivery, do not try to check the hemorrhage until a considerable quantity of blood is lost, as this loss is helpful. Promote diuresis and catharsis. Give salines per rectum and subcutaneously, according to need. A continuous irrigation of the rectum with saline solution at 115° F. is one method of treatment. If the hemorrhage is slight, venesection may be necessary. In urgent cases *decapsulation of the kidneys,* according to the method of Edebohls, is indicated. In uremic convulsions spinal puncture may bring relief.

Encephalitis Lethargica

Encephalitis lethargica, or "sleeping sickness," is an acute infectious disease involving chiefly the brain, to a lesser extent the spinal cord, and frequently the meninges and peripheral nerves. Of the latter, the cranial nerves are particularly affected.

Various syndromes closely resembling this disease as it is known at present have been on record since early in the eighteenth century, having occurred both in sporadic and epidemic form. It was not until the recent pandemic, however, that the condition was looked upon as a distinct disease entity when, at its occurrence in Austria, in the winter of 1916–17 it was first observed by von Economo who named it "encephalitis lethargica." Since then outbreaks are known to have occurred in nearly every country in the world. The disease was first recognized in the United States toward the end of 1918.

Etiology.—The cause of the disease is still a debatable question. From

its close association with influenza in the recent pandemic as in the one of 1892 it is thought that both diseases may have a common etiology. Likewise, having very much the same pathology as occurs in infantile paralysis it is believed that the causative factors may also be somewhat similar in both these conditions, notwithstanding the differences in their clinical manifestations. Experimentally, a filtrable virus has been isolated which was capable of reproducing the same disease in monkeys.

Individuals of all ages are susceptible to the disease, although statistics show the greatest incidence between 20 and 50 years of age.

Symptoms.—Prodromal symptoms occur lasting from a few hours to two weeks. These consist of violent headache, giddiness, insomnia, pains in the back, asthenia, both mental and physical, and languor which passes into the lethargic state and sometimes into deep coma. Contrary to its name, however, many cases of the disease are on record in which no lethargy existed. Cranial nerve involvement is an early manifestation resulting in ophthalmoplegia with early diplopia, ptosis of the lids, paralysis of facial muscles with difficulty of speech and swallowing. Sensory disturbances are rare and a clear mentality is maintained throughout unless the lethargy is pronounced. Recovery is prolonged in many cases and residual symptoms are frequently observed.

Diagnosis.—There are no specific means of making a positive diagnosis of this disease. It, therefore, becomes necessary to arrive at same on the basis of exclusion, taking into consideration the most characteristic features of the disease as mentioned in the symptomatology. Differentially, the conditions which must be considered are poliomyelitis, tubercular meningitis, syphilis of the nervous system, brain tumor and brain abscess, cerebral hemorrhage and thrombosis and the various psychoses accompanied by lethargy. Blood and spinal fluid examinations as yet yield no positive results in this condition.

Treatment.—Careful nursing and general care are the all-important measures. The nutrition of the patient is to be observed very carefully. Lumbar puncture relieves the distressing headache in many cases. Drug therapy has but limited indication and is to be employed only symptomatically. One of the author's cases has made a complete recovery following the subcutaneous administration of soamin.

Epilepsy

Idiopathic epilepsy is due to some obscure irritation of the cerebral cortex characterized by attacks of unconsciousness with general convulsions.

Jacksonian epilepsy (*partial epilepsy, cortical epilepsy, symptomatic epilepsy*) is usually symptomatic in form, and is characterized by periodical convulsions affecting only certain groups of muscles and often unattended by unconsciousness. It is due to disturbance of the projectional motor center.

Hystero-epilepsy is a form of hysteria, so is catalepsy.

Idiopathic epilepsy is seen in three forms, grand mal, petit mal, and psychical epilepsy.

Petit mal is the form where there is an attack of unconsciousness, but no convulsion.

Grand mal is the form where there is unconsciousness with convulsions.

Psychical epilepsy is a rarer form, with acute mental disorders.

Etiology.—Heredity is the most important of remote causes, as a neurotic family history can be obtained in about one-quarter of all cases. It is rare to have a history of epilepsy in the father or mother, but we often find one or both suffering from a nervous disease or alcoholism. Epilepsy or insanity is found in the family history of about one-third of the cases. Intermarriage of neurotic persons contributes powerfully toward the tendency to convulsions in children. We find an exciting cause in about one-third of the cases. Blows on the head, dissipation, fright, and continued reflex irritation act as causes. Acute infectious diseases, powerful emotions during pregnancy, injuries during labor, and syphilis, have some influence. Rickets, sunstroke, masturbation, eye strain, ear irritation, dyspeptic states, and lesions involving the peripheral nerves are among the more important of the exciting causes. There is a slight preponderance of cases among males. What rôle anomalies of internal secretion or anaphylaxis plays in epilepsy is not yet established.

We see the greatest number of cases between the ages of ten and fifteen. It occurs very seldom after twenty. If it develops after thirty-five, it is not idiopathic, but is usually due to syphilis, alcoholism, plumbism, or injury.

Symptoms.—Grand Mal.—A patient may feel premonitory symptoms for some days, such as general malaise, irritability, or giddiness. In about half the cases the attack begins with a peculiar sensation called the aura, which gives a warning to the patient that an attack is impending. There are different forms of aurae, the sensory being the most common. A sensation as of a mist is felt in some part of the body, mounting toward the head. There are *ocular aurae,* such as flashes of light or color, strange forms, double vision, or blindness; *auditory aurae,* such as strange voices or sounds; *olfactory aurae,* such as a sensation of a disagreeable odor; and *psychical aurae,* such as alarm, terror, or a strange dreamy sensation. Forced movements may precede an attack, such as moving forward rapidly, *procursive epilepsy,* or rapidly turning around as on a pivot. Just preceding the attack, which is abrupt, the patient usually utters a wild cry, scream, or groan and falls to the ground unconscious. We may divide the convulsions into three stages:

1. *Tonic Spasm.*—The face is pale; the head, eyes, and mouth are drawn back and rotated to one side. The whole body is in a state of rigidity. The hands are clenched, the arms and forearms flexed, the legs

extended, and the feet extended and inverted. The distortion of the body is not always the same. There is a respiratory spasm also, which makes the face dusky or livid. This stage lasts from a few seconds to one or two minutes, and merges into the second.

2. *Clonic Stage.*—There are tremulous vibrations, which increase until the limbs are jerked and violently tossed about. The face muscles in the clonic spasm cause frightful contortions. The eyes roll; the eyelids are opened and closed; the pupils are immovably dilated, but oscillate after the attack. Foamy saliva is forced from the mouth, and the tongue is likely to be bitten. The respirations are noisy and stertorous. Urine and feces may be passed involuntarily, especially in the night attacks. The temperature is usually normal, but there may be a slight rise. This stage rarely lasts more than one or two minutes, and the patient passes into the third stage.

3. *Stage of Coma.*—A deep sleep, with or without noisy breathing. After a few minutes or hours, the patient wakes with a headache or mental confusion and muscular soreness.

Status Epilepticus.—The attacks may follow one another in rapid succession, without the patient's regaining consciousness. The pulse, respiration, and temperature rise, and the condition becomes serious. Death may ensue from exhaustion.

Postepileptic Symptoms.—After emerging from the coma, the patient may appear as in a trance and move about performing senseless and purposeless actions, although he seems perfectly conscious. This condition of epileptic automatism may pass into epileptic mania, in which condition the patient is dangerous to those about him. A slight and transient hemiplegia or aphasia may be noticed after an attack. Mental impairment and ultimate dementia may be the result of attacks of epilepsy.

Nocturnal Epilepsy.—People may have attacks of epilepsy in their sleep, and at no other time, so that the condition may exist for years without the patient or his friends knowing it.

Petit Mal.—There is a sudden loss of consciousness, so that the patient stops what he is doing, his face becomes pale and fixed, and his pupils dilate. In a few seconds he regains consciousness and continues what he was doing as if nothing had happened. Aurae seldom occur in this form, but if they do, they usually consist in forced movements.

Psychical Epilepsy.—The patient may perform some peculiar automatic action, such as undressing himself, tearing anything within reach, rubbing his face and beard, or spitting about in a careless way. Sudden outbursts of maniacal excitement may take place, and during these (*masked epilepsy*), crimes and particularly assaults may be committed. There are many different manifestations of petit mal.

An attack may terminate in facial twitchings or sudden jerkings in the limbs, sudden tremor, or sudden visual sensations. In the majority

of cases grand mal ultimately develops. The two forms may alternate.

Jacksonian Epilepsy.—This form is caused by some irritation of the motor centers, especially of the cortex of the brain. Consciousness is not lost in these attacks, or only very late in the attack. The spasm begins in a group of muscles, and extends until the whole limb or face is involved. There may be premonitory numbness and tingling. The extent of the brain lesion may increase, making the convulsions involve more muscles. The convulsions may become general.

Diagnosis.—Petit mal is simulated by syncope, Ménière's disease, cardiac lesions, and indigestion. In these there is no actual loss of consciousness, which we usually see in petit mal. Grand mal is simulated by the convulsions from uremia, simple convulsions in children, convulsions from organic brain diseases, malingering, and hysteria. In uremia there is scanty, albuminous urine with high arterial tension. Convulsions in children can usually be traced to some readily recognized cause. In organic brain disease (tumors, paresis) the history and other symptoms usually serve to distinguish them. Malingerers do not bite their tongues and do not foam at the mouth, and the attack can be stopped by strong pressure over the supra-orbital notches.

Gowers has formulated the following table to distinguish epilepsy from hysteria, which may closely resemble it:

	Epilepsy	*Hysteria*
Apparent Cause.	None.	Emotion.
Warning.	Any; but especially unilateral or epigastric aurae.	Palpitation, malaise, choking, bilateral foot aura.
Onset.	Always sudden.	Often gradual.
Scream.	At onset.	During course.
Convulsion.	Rigidity followed by "jerking"; rarely rigidity alone.	Rigidity or "struggling"; throwing about of limbs or head; arching of back.
Biting.	Tongue.	Lips, hands, or other people or things.
Micturition.	Frequent.	Never.
Defecation.	Occasional.	Never.
Talking.	Never.	Frequent.
Duration.	A few minutes.	More than ten minutes; often much longer.
Restraint necessary.	To prevent accident.	To control violence.
Termination.	Spontaneous.	Spontaneous or induced (by water, etc.).

Prognosis.—Except in jacksonian epilepsy and in certain forms of reflex epilepsy, the prognosis is not good, although treatment will give con-

siderable relief. It does not tend to markedly shorten life. In a large number of cases the mental faculties are considerably impaired, but many epileptics lead an active, useful life. Where the convulsions develop in adults, particularly when they are caused by syphilis, and in children in acute fevers, the prognosis is better.

Treatment.—In jacksonian epilepsy we may be able to remove the cause, as by antisyphilitic treatment or by surgical means. If rickets, eye strain, ear irritation, or digestive disturbance exist, treat it. If there is an irritation from a long and tight prepuce, perform circumcision. However, even with the removal of the cause, where the condition has existed for some time, the results are imperfect, for there seems to be a habit of nerve discharge established. The Wassermann blood test should be made in all cases of epilepsy and, if found positive, antiluetic treatment should be given.

Where the aura is slow, we may be able to check the spasm by inhalations of nitrite of amyl. If there is an ascending sensory aura, we may abort the spasm by tightly encircling the part with the hands or a tight bandage. Usually, however, the aurae are too short to allow of any preventive measures.

During the attack we should have the patient on his back, with the clothes loosened and something placed between the teeth, such as a handkerchief, to prevent the tongue from being bitten. If the convulsions are severe, we may administer a little chloroform by inhalation or morphin subcutaneously.

In the case of children, the parents should understand that the disease is incurable, but that much can be done by proper management. The children need firm, but kind treatment. If caprices and whims are indulged, moral control, which is so necessary in these cases, is weakened. As most patients are not incapacitated for occupation, they should be educated and have some definite pursuit. Should the mental impairment become marked, and the patient become extremely irritable or violent, it is better to place him in an institution under competent supervision. An outdoor life with exercise, hygiene, and proper diet has a very great influence for good. Marriage should be interdicted.

It is better to order a diet mainly vegetable, although meat may be permitted once a day. Regularity in meals is important, and overloading of the stomach should be prevented.

Medicinal Treatment.—Bromids seem to have a special influence. The mixed bromids and bromomangan give the best results. The drug must be well diluted in water or milk, and should be administered up to the production of mild bromism, shown by drowsiness, mental depression, a foul breath, and muscular weakness, and then the dose reduced until the patient is kept just within its physiological action, known by the loss of the palate reflex. By diluting the medicine with alkaline waters, and also

giving arsenic, the tendency to acne is diminished. From ʒss to ʒii of the bromids a day is usually a sufficient dose for an adult, and we should strive to give a full dose some time, from four to six hours, before an attack is likely to occur. The bromid treatment should be continued for two or three years after the cessation of the attacks. Some patients do not stand the bromids well, and we must depend upon other drugs, but principally upon outdoor exercise, hygiene, and proper diet.

Other drugs have been recommended. Antipyrin with the bromid is of value. A combination of bromid of ammonium, gr. xx to xxx, antipyrin, gr. vii, and Fowler's solution, mn. ii to iii, twice daily, is recommended. Sulphonal may be administered with the bromid, also chloral and cannabis indica.

C. Am Ende, of New York, reports excellent results in the treatment of epilepsy from the administration of the following drug combination:

℞	Fl. extract thyroid	ʒiiss	10,0
	Tinct. adonis vernalis	gtt. x	0,6
	Aquae	ad ʒiv	120,0

Sig.: One teaspoonful in water three times a day.

Diet in Epilepsy.—Bouillon tablets, each containing 17 grains sodium bromid, are now obtainable under the name of *sedobrol.*

Technic of the Salt-poor-Bromid Diet.—The diet was devised by Toulouse-Richet and consists of 1,000 grams milk, 300 grams beef, 300 grams potatoes, 200 grams flour, 70 grams (2) eggs, 50 grams sugar, 10 grams coffee, 40 grams butter. It is administered as follows:

7 A. M.—¼ liter (½ pint) milk.

11 A. M.—Coffee with 2 cakes prepared with eggs, flour, milk and sugar.

3 P. M.—Porridge of flour and sugar mixed with boiling milk.

5.30 P. M.—Bouillon with salt, meat cooked without salt, unsalted potatoes fried in butter; milk served as beverage in addition to the water.

This food is said to contain 2 grams of common salt, and in addition the patient is given 2 grams sodium bromid per diem. Later on Toulouse recommended that the salt content be not reduced below 5 grams per diem.

Rules for Epileptics.—Polk gives the following printed rules for the guidance of epileptics. They do not cover every case, but there can be no mistake in the observance of them:

Have meals regularly, with the last meal of the day early and light. Do not continue eating until there is a sense of fullness. Do not eat peas, beans, veal, much meat, or cereals. A vegetable diet is the best. Fish and milk are permissible. Use as little salt in the food as possible and forego tea and coffee. Do not eat much at one sitting. Keep the bowels free. Flush the colon frequently. Take warm salt baths, not remaining in

Differential Diagnosis and Treatment of Coma

	Cerebral Compression, Meningeal Hemorrhage.	Coma in Meningitis.	Epilepsy, Postepileptic Coma.	Coma in Insulation, Heatstroke.	Coma in Sunstroke.	Coma in Freezing.	Coma in Lightning Stroke.	Syncope Cerebral Anemia.	Feigned Coma, Hysteria.
HISTORY AND ONSET	History of injury, may recover and relapse some hours afterward.	History of meningitis, coma after days and weeks of illness.	History of epileptic seizures.	Exposure combined with physical exertion and alcoholism, onset sudden or gradual.	Exposure to sun combined with fatigue and alcoholism, onset abrupt or preceded by pain in head, vertigo, nausea.	Exposure to intense cold combined with fatigue, hunger, and alcoholism.	Death or coma.	Sudden onset.	Occurs in males, but more in females, also in children, onset sudden.
EXAMINATION	Skull often fractured, blood and serous discharge from nose or ears, localized and general paralysis, pupils first unequal, then dilated and no reaction to light, respiration may be of Cheyne-Stokes type, pupils often unequal, pulse first slow, afterward rapid and irregular, retention of urine, increasing stupor.	Conjunctivae congested, Tâche meningitique, Kernig's sign, sphincter paralysis, pupils dilated with intracranial effusion.	Pale or cyanotic skin, frothing at mouth, tongue bitten, seminal discharge, pupils react to light, pulse, temperature, and respiration not characteristic.	Skin cool and clammy, face pale, pulse rapid and feeble, involuntary discharges, coma yields to treatment.	Pulse rapid and bounding, stertorous breathing, skin hot and dry, eyes suffused, temperature very high, delirium, convulsions, rigidity after recovery, pain in head may continue and mental weakness, chronic meningitis, and insanity result.	Comatose condition and varying degrees of frostbite, from congestion to blistering and gangrene.	Superficial or deep burns, disturbance of vision after return of consciousness, or paralysis in some cases.	Pale, clammy skin, sometimes nausea, slow, weak heart, sighing respiration, sometimes convulsions, coma of short duration.	Examination reveals nothing particularly abnormal; coma may alternate with hysterical crying.
TREATMENT	Rest, cold to head, light diet, gavage, enema, enteroclysis, operation, rectal feeding.	Symptomatic; catheter, enteroclysis, feeding by gavage, rectal feeding. Spinal puncture.	Symptomatic: wait for consciousness.	Cool douche and friction, warm baths, stimulation, fresh air to breathe, camphor, whisky, digitalis.	Cold applications, tubbing at 60°, or cold pack, cold enemata, venesection, stimulation, ice to head.	Preventive by protection and maintenance of circulation, application of warmth, stimulation; chilblain, when recent, may be rubbed down with snow; when of long standing, massage is indicated; gangrene is treated antiseptically.	Artificial respiration, external heat, stimulation.	Loose clothes, lower the head, cold douche, ammonia to nose, hypodermic of whisky or strychnin.	Look wise and do little; feigned coma is very misleading.

Differential Diagnosis and Treatment of Coma

	Uremic Coma.	Apoplectic Coma.	Alcoholic Coma.	Diabetic Coma.	Opium or Morphin Coma.	Belladonna Coma.	Coma in Hepatic Cirrhosis or Acute Atrophy.	Coma and Asphyxia: from Gas, Foul Air, or Carbonic Oxid.	Coma in Brain Injury, Cerebral Concussion.
HISTORY AND ONSET	Acute or chronic nephritis, delirium, convulsions, profound coma.	Follows in the wake of sudden hemiplegia.	Follows alcoholic delirium.	History of diabetes, slow onset.	Onset gradual.	Dry mouth and throat, coma preceded by delirium.	History of alcohol, syphilis, or infection.	Breathing illuminating gas or bad air or coal gas.	Onset immediately after injury.
EXAMINATION	Pale, cyanotic, edematous face or general dropsy, stertorous breathing, usually fever temperature, full pulse, albumin and casts in urine, repeated convulsions, no sign of injury or paralysis.	Pale skin, no sign of injury or hemorrhage, paralysis evident, slow stertorous breathing, irregular, weak pulse, sometimes fever, involuntary flow of urine, profound stupor, deviation of tongue.	Congested face and eyes, hot skin, no paralysis or tongue deviation, usually no fever, rapid respiration, large pupil, strong pulse, alcohol breath, vomiting, seldom convulsions, urine retained, no visible injury, can be aroused.	Pale skin, no paralysis, rapid, shallow breathing, normal temperature, rapid, weak heart, sweet or acetone smell to breath, sugar in urine, no convulsions as a rule, profound stupor.	Pale, cool skin, no paralysis, pupil contracted, slow, irregular respiration, difficult to rouse patient.	Skin flushed and dry, slow, deep respiration, dilated pupils, rapid pulse, retained urine.	Body jaundiced, sallow, emaciated, small liver, large spleen, sign of portal obstruction, epistasis, hematemesis, or bloody stools, may have delirium or convulsions.	Mucous membranes livid and blue, noisy respiration, pulmonary edema, small, rapid pulse, sometimes convulsions.	Skull usually notfractured, no profound paralysis, pupils equally contracted and reacting to light, slow, shallow breathing, weak pulse, may be rapid and irregular, incontinence of urine.
TREATMENT	Enema, venesection, inhalations of chloroform, hot pack, draw urine with catheter, enteroclysis at 115° F., decapsulation of kidneys. Spinal puncture.	Enema, venesection, ice to the head, hot water bottle to the feet, feed with care, gavage, absolute rest, keep lips and nose moist, rectal feeding.	Enema, catheter, cold to head, heat to body, keep lips moist, also nose, sustain heart, enteroclysis at 110° F.	Enema, catheter, keep lips and nose moist, enteroclysis at 110° F., sustain heart, saline hypodermoclysis, opium, codein, morphine, in case of convulsive seizures.	Wash stomach, enema emersion, catheter, strong coffee, artificial respiration, flagellation, atropin sulph. (gr. $\frac{1}{100}$), hypodermically, strong faradic current.	Emetics, stomach washing, catheter, enteroclysis, hypodermoclysis, hypodermic stimulation.	Symptomatic, about same as in diabetic coma.	Fresh air, artificial respiration, hypodermic injection of whisky and digitalis.	Rest, cold to head, light diet, gavage, stimulation, enema, enteroclysis.

the water sufficiently long to cause fatigue. Sleep with the head high and keep the feet warm at all times, and especially at night. See that any defects in the eyes are corrected and do not use the eyes a long time without resting. If glasses are worn, have the frames straightened at regular intervals. Take as much out-door exercise as possible without fatigue. Spinal douches and massage should be taken regularly. If seizures come early in the day take 15 grains of sodium bromid before retiring. Transduodenal irrigation should be tried in epilepsy.

Coma

Coma may be defined as abnormally deep and prolonged sleep, with the cerebral functions in abeyance. It may be caused by a number of different factors, and it is many times impossible to determine the cause in an unconscious person, seen for the first time in coma and without a history.

The tables on pages 798 and 799 will prove an aid in distinguishing the different causes leading to coma, and in establishing proper treatment.

Functional Nervous Derangements with Psychical Alterations Predominating

General Remarks

Functional nervous derangements make up the bulk of medical practice, and they can usually be benefited and cured. In the activity of the age, the ambition for fame, money, and pleasure has become so contagious that many people are led to extremes of every sort. Rules of hygiene are utterly disregarded, and overworked nerves will manifest themselves sooner or later. Neurotics and asthenics are often born as such.

The natural credulity of man, the mental condition resulting from over-fatigue and unaccomplished or defeated ambitions, the peculiar innate desire of man to attain the unattainable, have a tendency to create neurotics who may be led to disregard their nervous or psychical ailment in their enthusiasm over a "new thought," and receive a suggestion that they are happy and are not ill, which benefits or cures them.

The physician should recognize such cases, and should treat them, as they need to be treated—by *mental suggestion*.

Neurasthenia

Neurasthenia is a functional disorder of the entire nervous system dependent upon malnutrition and possibly on some anomaly of internal secretion, and characterized by nervous weakness and irritability. Nervous prostration, nerve tire, nervous exhaustion, are synonyms. *Hypo-*

chondria is a term applied to those neurasthenics who are uneasy in regard to their health and depressed in spirits.

Etiology.—Nature demands a balance between the storing and expenditure of energy. If this demand is disregarded, exhaustion results. Some one has said that the cells of the body demand twice as much rest as work.

Forms.—We speak of primary and secondary forms.

1. Primary neurasthenia is caused by excessive expenditure of nervous energy. Underlying this there may be an hereditarily weak nervous system; feeble health during childhood, which favors a poor nervous system; vicious early education and training; exhaustion from the effort to excel or even to exist; anxiety, worry, mental expression, and fear; overwork, mental or physical; sexual overindulgence; and overstudy. Doubtless in young children who are pushed beyond their capacity by overambitious parents or tutors neurasthenia may exist with favorable hygienic surroundings, but the great majority of cases are due to unsystematic, unscientific, and poor methods in the acquisition of knowledge. The mind of a student who is perfectly well physically, of one who exercises out of doors, who sleeps well and sufficiently, who has plenty of suitable food, and who has sufficient diversion, is very unlikely to be overworked, but rather to remain in a healthy condition. A student should develop a healthy body, should learn to be methodical and regular in his habits, learn to concentrate his mind and study with good method, and allow sufficient time for exercise, sleep, and diversion.

2. Secondary neurasthenia is due to a deficient supply of nervous energy. Leading to this are diseases of all kinds of an organic nature, which weaken the nervous system; auto-infection as a result of indigestion; constitutional diatheses, including gout and rheumatism; infectious diseases, such as typhoid fever, grip, and malarial disease; and poisons, including alcohol, tobacco, and drugs, such as morphin, cocain, and chloral.

Symptoms.—Cerebral Symptoms.—There is headache, which may be occipital or frontal, and dull in character, with vertigo, insomnia, sensitiveness of the scalp, and peculiar sensations, such as fullness, pulsation, and the feeling as if a band were about the head. *Mental* capacity to work is impaired; the memory is poor; concentration is difficult; the patient is irritable; there are prominent peculiarities of disposition; the patient has morbid fears of people and places, is anxious and apprehensive; and the respiration is imperfect and the pulse rapid.

Spinal Symptoms.—There is actual pain, especially in the back of the neck and in the sacrum; there is a sensitiveness about the ribs and along the intercostal nerves; different parts of the body may feel supersensitive or irritated; the legs do not seem strong enough to hold one up. Sexual irritations are common; there may be erections, emissions, im-

paired power, or irritability of the bladder or urethra, with frequent urination.

Vasomotor Symptoms.—There are hot and cold sensations, cold feet and hands, sweating, transitory blueness or swelling, the tâche cérébrale of Trousseau, tachycardia, and palpitation of the heart.

Gastro-intestinal Symptoms.—Indigestion and dyspepsia occur, particularly the form known as hyperacidity, and there may be constipation, flatulence, or pseudomembranous colitis.

Sensory and Motor Symptoms.—There are indefinite pains and paresthesiae, joint affections, apparent paralysis, but with no change in the electrical reactions, and imperfect vision, asthenopia. The visual field may be contracted. Sometimes other senses may be affected, as with tinnitus aurium.

It is seldom that we see all these symptoms in one patient. Many times some one or some group is very pronounced, and the others are not present. They change from day to day.

Diagnosis.—If we can find a cause for nervous exhaustion other than organic disease, we may, by "sizing up" the patient, by noting the variability of the symptoms and the disproportion between the complaint and the actual trouble, pronounce the trouble neurasthenia. The physician should be very careful to exclude organic disease.

Prophylaxis and Treatment.—Try to teach patients how to live. Kant's rule—eight hours for work, eight for diversion, and eight for sleep—is a very good one to follow if you have money. See that the children are being educated and trained properly. Effective prophylaxis in the adult is difficult.

The treatment of the disease is very unsatisfactory, for it takes a long time to reëstablish the nerve energy. *Rest,* proper food, exercise, hydrotherapy (cold douches), and diversion should be resorted to. The treatment should be very systematic and very varied to keep the patient interested, contented, and yet free from fatigue. Well-directed mental suggestion is important.

Drugs may be used when necessary to meet the symptoms. Tonics, sedatives, and electricity are indicated. The glycerophosphates seem the best modern drugs for nervous fatigue. The use of cacodylate of sodium subcutaneously has given good results. Vibratory massage is excellent. Static electricity and the high frequency current are popular—glandular preparations should be tried. Hydrotherapy in the form of tonic baths gives excellent results.

Psychasthenia

Psychasthenia is a condition of nervous exhaustion in which mental and cerebral symptoms are most prominent. The patient forgets easily, and the mind's labor is hard in trying to pay attention, to remember and

to concentrate thought. Logical thinking is impossible. He becomes worried by morbid fears and unwelcome and alarming obsessions. There is general discomfort and distress. He is irritable, ill at ease, and has a distaste for mental occupation and physical work. There are all kinds of feelings of distress: pressure, headache, tenderness of the scalp, dizziness, numbness, hot and cold sensations, ringing in the ear.

Treatment.—The treatment is described in detail under neurasthenia.

The following table indicates the main features of the rest cure for neurasthenia and psychasthenia.

Rest Cure for Neurasthenia and Psychasthenia

Isolation

First Six to Eight Weeks.—Absolute. No visitors (except doctor, masseur and nurse). Nurse, highly trained, discreetly sympathetic. No letters.

After Six to Eight Weeks.—Limited number of short letters may be received and dispatched.

Rest

First Four Weeks.—Perfect quietude, no conversation. Patient must be fed and helped to turn in bed.

After Four Weeks.—Sit up twice daily for ten minutes, then little walking once daily, then short carriage exercise, patient being carried up and down stairs.

Massage

Begin after three days of "rest"; whole body (except face). Duration for one-quarter of an hour, increasing to one hour daily; after one week, twice daily for forty minutes each time.

Diet

First Four Days.—Milk, 3 ounces every two hours, increasing up to 4 pints daily, with addition of casein food preparation.

On Fifth Day.—Add light fish, breakfast.

On Seventh Day.—Add cutlet or chop, midday.

After First Week.—Three full meals + same allowance of milk.

Sample Diet on Tenth Day (Playfair).—6 A. M., ½ pint of meat soup; 7 A. M., cup of black coffee; 8 A. M., porridge with gill of cream, one egg, three slices of bread and butter; 11 A. M., ½ pint of milk; 2 P. M., ½ lb. of steak, vegetables, omelette, ½ pint of milk; 4 P. M., ½ pint of milk, three slices of bread and butter; 6 P. M., cup of gravy soup; 8 P. M., fried sole, roast mutton, vegetables, fruit, cream, and ½ pint of milk; 11 P. M., ½ pint of soup. (*See also* Rest Cure at Home, Section I.)

Hysteria

(*Hystero-epilepsy*)

Definition.—A functional disturbance of the nervous system, characterized by mental and moral perversion, lack of self-control, and disorders of any or all of the bodily functions.

Etiology.—It is a product of modern civilization, and is more prevalent in women than in men. It may appear at any age, but is most common between the ages of fifteen and twenty-five. *Hereditary influence* is considerable, as in many cases there is a family history of nervous troubles. Improper early training is largely at the root of it, creating a lack of moral responsibility and self-control. Directly, the emotions—fear, anxiety, jealousy—unhappy love affairs, domestic worries, sexual excess, masturbation, physical conditions, such as indigestion, bad habits, injuries, and accidents, especially those attended with fear, and anemia causing malnutrition of the nervous system and rarely ovarian or uterine disease, may cause hysterical conditions.

Pathology.—The disease is looked upon as purely functional, and no organic lesion is present. Anomalies of internal secretions may be basic factors.

Symptoms.—As there is no known disease or morbid objective symptom which cannot be imitated by an hysterical patient, it is readily seen that its manifestations are legion. A brief classification of its most prevalent forms will be given.

Motor Symptoms.—*Convulsions.*—These may be mild, appearing after some emotional excitement. The patient laughs and cries alternately, feels a "ball" in her throat (*globus hystericus*), and has painful or peculiar sensations resembling an aura. Then comes the convulsion, which subsides gradually, usually with the passage of flatus or of a large amount of limpid urine. A more severe form, classed as *hystero-epilepsy,* may be marked by excessive convulsive motions and subsequent emotional display, such as *cataleptic poses,* opisthotonus, delirium, and hallucinations (*See* article on Epilepsy for differentiation).

Paralyses.—Any part of the motor apparatus may be affected, but paraplegia is the most common form. Aphonia is frequent. There are usually some other symptoms of hysteria combined with the paralysis.

Contractures may affect any joint. They disappear during sleep or *chloroform narcosis. Spasms* are not uncommon.

Sensory Symptoms.—There may be irregular areas of anesthesia and hyperesthesia. Hysterical hemi-anesthesia is common. Hyperesthesia to the extent of pain in the head, of an agonizing character, like that of a nail being driven into the skull, called hence *clavus hystericus,* is not infrequent. The spine, abdomen, and breast are regions for hyperesthesia.

Special Senses.—Lessening of the visual field, hemi-anopsia, blindness, or change in the perception of colors is seen. Loss of the senses of taste, smell, and hearing is common.

Digestive Symptoms.—*Globus hystericus*, spasm of the pharynx and esophagus, vomiting, anorexia, a depraved appetite, gastric pain, reversed peristalsis, flatulence, diarrhea, and constipation may be hysterical.

Respiratory Symptoms.—Rapid breathing, dyspnea, extraordinary cries and sounds, a dry paroxysmal, barking cough, and spurious hemoptysis may be seen. The blood is of a pale red color and comes from the mouth or pharynx, unless deception is practiced, for which we must always be on the lookout.

Circulatory Symptoms.—Irritability of the heart, rapid pulse, pain over the heart (pseudo-angina pectoris may be imitated), hot flashes and cold chills, pallor, flushings (general or localized), circumscribed edema, and hemorrhages in the skin are seen. These latter are usually fraudulent in origin.

Urinary Symptoms.—After an hysterical attack the urine is abundant, watery, and of low specific gravity. Retention is common, but incontinence is unknown, which is a diagnostic point between hysteria and true epilepsy. Partial or complete anuria may be seen, and during this period the sweat, vomit, and other discharges become loaded with urea. Uremic convulsions never occur in cases of pure hysteria. Bladder and urethral irritation, with frequent micturition, is common.

Joint Symptoms.—Following slight injuries, or without injury, one of the larger joints, such as the knee or hip, becomes swollen and flexed and resists passive motion (Brodie's joint). However, changes in its position may be observed. The skin over the joint may be hyperesthetic; it is usually cool, but at night may be hot and painful. Sometimes, if the condition lasts long enough, there may be wasting of the muscles and organic changes in the joint.

Temperature.—This is usually normal. Rarely an elevation to from 102° to 103° is observed, and exceptionally a rise to 108° to 110° has been recorded. These high temperatures are probably in some way produced fraudulently. Fever with symptoms of peritonitis is occasionally seen. Meningitis also may be simulated.

Mental Symptoms.—Moral perversion, increased irritability, emotional exaggerations, impaired self-control, and craving for notice and sympathy are manifested. This leads to self-injury, as by swallowing needles, sucking blood and vomiting it, and inflicting sores which are not allowed to heal. There may be purposeless criminal acts, such as setting fire to houses and stealing. Depression is common, occasionally hallucinations may occur, and melancholia may be feared. Trance and catalepsy may develop. A patient generally has more than one of the many symptoms, and may have many.

Trance is an hysterical condition, developing spontaneously or after some hysterical attack, in which all animation is apparently suspended.

Catalepsy is an hysterical or hypnotic condition in which the limbs remain in any position in which they are placed for a greater or less length of time.

Diagnosis.—The diagnosis is made from a study of the general condition, and not from a single symptom.

FIG. 166.—HYSTERICAL ATTACK WITH CATALEPSY. (After Strümpell, "Text-book of Medicine.")

Prognosis.—The prognosis as to life is very good. The duration depends upon the severity of the symptoms and the environment and moral force of the patient.

Treatment.—The physician should make a most careful examination of his patient, and exclude organic disease. He should obtain the confidence of his patient and let her know that he understands the case. The suffering is real, but the patient should not receive too much sympathy, as it is necessary to exert self-control as much as possible. Educate the morals and try to give mental change. If the home and surroundings are at the bottom of the trouble, send the patient away and furnish her with cheerful diversion. Hydrotherapy, electrotherapy, massage, the rest cure, and mental therapeutics may be combined with tonics, such as strychnin, iron, and quinin. Treat the symptoms, but never give opium in any form. Polyglandular solution (Marvell) should be tried.

Hysteria in Children

This condition is known as *hysterical paralyses, aphonia, neuralgia, contractures, hyperesthesia, holding the breath.* Psychical, sensory, and motor phenomena of a morbid character are common from infancy through childhood in anemic children having neurotic parents or neurotic surroundings, in the offspring of alcoholics, and as complications of acute disease. Hysterical manifestations are possible as soon as the child has acquired the capacity to receive impressions and develop conceptions.

In discriminating between hysteria and organic disease it is a great mistake to underestimate the shrewdness of a child, and the physician will readily deceive himself in diagnosis and thwart himself in the way of moral treatment if he unthinkingly makes the child or its hysterical mother a confidant of his views.

Hysterical and epileptic conditions blend and alternate, and the line of demarcation is exceedingly vague. It is therefore useless to go into details regarding diagnosis, because such matters will be decided by the acuteness and tact of the medical attendant, and not by a pen picture of conditions by no means clear cut.

Prognosis.—The prognosis is good, but there is a tendency to relapse.

Treatment.—Rational hygiene and the handling of hysterical children by a kindly, firm, and intelligent woman is a *conditio sine qua non* of successful management. Self-control must be developed. Massage, cold baths, and gymnastics are indicated, and punishment is often a necessary feature in the treatment. As chronic intestinal indigestion is at the bottom of many ailments, every effort should be made to secure normal digestion for the child.

The Traumatic Neuroses—Traumatic Hysteria

Traumatic neuroses are morbid conditions which originate with a shock and show symptoms of neurasthenia, or hysteria, or both. The name was given because the condition was supposed to be due to an inflammation of the meninges or the spinal cord.

Etiology.—Although cases develop after an accident, often in a railway train, where there is a bodily shock or concussion, the neurosis may arise without the shock or concussion. The patient may simply know that there has been an accident to the train on which he is riding, or may have seen some terrible accident which has sufficed to bring on the symptoms. A week may elapse after the accident before the symptoms develop, the patient having been perfectly well during this time (railway spine).

Symptoms.—Simple Traumatic Neurasthenia.—Usually the symptoms develop some days or weeks after the accident, which may have done

no bodily harm. Headache, insomnia, loss of concentration, irritability, despondency, and, in extreme cases, melancholia may develop. In fact, all the symptoms of neurasthenia may be present, and according to the prevalence of spinal or cerebral symptoms, the name of railway spine or railway brain is given.

Cases with Marked Hysterical Features.—In addition to the neurasthenic symptoms, there are cases in which the emotions play an important part. Self-control is impaired. A striking feature of these cases may be a violent bodily tremor. Hemi-anesthesia, achromatopsia, and limitation of the field of vision are among the more frequent hysterical signs.

Cases in which the Symptoms Suggest Organic Disease of the Brain or Spinal Cord.—There may be no fracture or external lesion, and yet some time after the injury or shock there may rapidly develop symptoms suggesting organic disease. Sensory and motor disturbances are the most common, but it is very difficult to distinguish hysteria from real injury. The symptoms upon which the greatest reliance can be placed as indicating organic change are optic atrophy, bladder symptoms, particularly in combination with tremor, paresis, and exaggerated reflexes.

Autopsies in cases where death follows spinal concussion in a few days may show nothing abnormal. In a few instances punctiform hemorrhages have been found in the brain and spinal cord. In a few cases where death has resulted a considerable time after the accident, and the symptoms have been those of neurasthenia and hysteria, there have been found sclerotic and softened areas in the cord and brain.

Diagnosis.—It is very difficult to detect a simulator from one who is really suffering from a trauma. Under usual conditions, pressure upon a really painful spot will increase the pulse rate; if the pain is simulated, the pulse rate does not increase. Optic atrophy, bladder trouble, and signs of sclerosis of the cord, indicating a degeneration of the lateral columns or multiple sclerosis, point toward organic disease.

Prognosis.—Traumatic hysteria is one of the most intractable affections which we are called upon to treat, but most cases recover.

Treatment.—The treatment is that of neurasthenia and hysteria. Suggestion has probably given the best results.

Insomnia

Sleeplessness is one of the most frequent conditions which physicians in large cities are called upon to treat. We should aim to discover the cause and remove it.

Causes.—We may class the causes as follows:

Pain—as with excessive headaches, fear, anxiety, overwork.

Poisons circulating in the blood, as in acute infections, Bright's disease, hepatic disease, and intestinal toxemia, arteriosclerosis.

Insanity, as in melancholia, mania, paranoia, and paresis.

Ordinary Types, Seen in Nervous People and Neurasthenics.—These cases may be divided into:

Those with *cerebral congestion.*

Those with *cerebral anemia.*

Prophylaxis.—In the absence of organic disturbances hygienic living is the principal preventive measure against insomnia.

Treatment.—The prime indication is to find the cause and treat that. An acid stomach is a frequent, unsuspected cause of insomnia; in these cases tea, fruit, fruit juices, acid wines, and articles fried in fat, as well as overeating, should be strictly avoided. An alkaline bitter before meals or a little bicarbonate of soda an hour or two after dinner and a mercurial at night now and then with a saline laxative next morning will be found useful, as will an occasional gastric lavage before retiring. A thorough cleansing of the bowels often induces a restful night.

Insomnia Due to Cerebral Congestion.—This form is recognized by distress and a feeling of distention in the head, muscular irritability, and overexcitability. We may endeavor to remove the congestion in the brain by various means. An enema or laxative may be given in the morning.

There are various forms of hydrotherapy to be tried always before drugs. These are to be used just before the patient goes to bed.

A *hot bath* sometimes succeeds in causing sleep, but contraction of vessels is likely to follow soon, and again cause congestion. A cold sponge bath after the hot bath seems to prevent this. A good plan is to have the patient stand in tepid water which reaches above the ankles, and then wrap around the body a dripping sheet from a pail of cold water, at about 80°, rubbing the body at the same time. Other resources are the *cold pack to the abdomen* and wearing a flannel cloth wrung out of water at about 75°, covered with a dry towel and then with a rubber cloth. The cold flannel soon becomes warm, and acts as a poultice, bringing blood to the abdominal cavity.

Exercise.—Five or ten minutes of calisthenics or exercising with dumb bells or Indian clubs before going to bed serve a good purpose, also a brisk walk outdoors before going to bed. Forcible respiratory movements, with deep inhalations of fresh air, at bedtime are also helpful.

Drugs.—Bromids are best for cerebral congestiou. Give gr. xx to xxv about half an hour before the patient goes to bed. A mixture of two or three of the bromids, such as bromid of sodium, potassium, ammonium, and strontium, seems better than one. Chloral hydrate and bromids may be combined. *Sulphonal* and *trional* should be given with food—sulphonal about one hour before bedtime, and trional fifteen to twenty

minutes before (gr. x to xx), also urethane (3i) and codein (gr. ½), may be taken together at bedtime, or hyoscin (gr. 1/100) or bromural (gr. xx).

Suggestion is of great benefit. Autosuggestion, or the suggestion of the physician, with a sugar tablet, or a hypodermic injection of sterile water, is effective at times.

Insomnia Due to Cerebral Anemia.—Patients with this form of insomnia usually sleep well at first, but wake up and cannot go to sleep again. Stimulation is indicated in these cases and the bowels should move regularly.

Beer, whisky, or strychnin (gr. 1/60) at bedtime does well. Chloral and chloralamid are good hypnotics in these cases. When a person wakes, and cannot fall asleep again, advise him to read in bed. Inhalations of the fumes of whisky or wine, or of ether, alcohol, and cologne (equal parts) on a handkerchief before going to bed may help in this class of cases. Opium, as a last resort, is indispensable in the insanities.

Insomnophobia

Norman Bridge [1] has called attention to insomnophobia. The horrors of insomnia are but slightly due to the want of sleep, and chiefly to the idea that to lie awake is a terribly nerve destroying thing. The victim of insomnia, he says, laments his infirmity and worries lest he may become a nervous wreck. This attitude of mind when he goes to bed, tends to keep him awake, for he is in a state of expectancy of insomnia; and what is worse, he is unhappy about it. If he would resolve that he does not wish to sleep, but would read, he would soon drop into normal unconsciousness.

Another error pointed out by this author is that rest for the body should be the main reason for retiring to bed. This is something over which one has control. Man should go to bed to give his body rest and relaxation; and the brain will put itself to sleep if it needs it. While the body is in relaxation it is not necessary that the brain should be unconscious in sleep. If the body is given its eight hours of regular rest, the brain may be left to take care of itself. If the insomniac is impressed with this fact, he will find that lying awake an hour or two while his body is at rest does not harm him. He will find his terror gone, he ceases to be an insomniac and becomes a philosopher. It is a common error for a man to put off his bedtime till late because he finds that he cannot sleep till then, or to get up early in the morning for the very poor reason that he is awake. He has gone to bed on the wrong theory—thinking that sleep is all the bed is for. We are foolishly provoked or alarmed at lying awake in bed—as bad as children afraid of ghosts.

[1] *Jour. Amer. Med. Assn.*, Sept., 1906.

Hypersomnia

(*Drowsiness*)

Hypersomnia occurs in the aged, in people of weak intellect, and in those given to eating too much and too fast. Persons suffering from anemia, leukemia, myxedema, are apt to complain of great drowsiness.

Dr. C. A. Dana [1] reports his conclusions regarding drowsiness as follows:

We find that morbid drowsiness and somnolence occur in connection with:

1. Anterior lobe disturbance, as in acromegaly.

2. Posterior lobe deficiency, as in the Fröhlich syndrome. We find that such somnolent conditions may occur when there is no other lesion such as neighborhood tumors or hydrocephalus.

3. Morbid drowsiness and somnolence occur, however, also in cases of tumors of the neighborhood region, whether these tumors involve distinctly the hypophysis or not.

4. Also in cases of other central brain disorders, such as chronic hydrocephalus and perhaps in pineal gland disease.

5. There are obscure cases of drowsiness and somnolence occurring in persons who have no distinct evidence of organic brain disease, but who have some of the minor symptoms of dyspituitarism. Hence, in these obscure cases investigation should be made for hypophyseal defects. These symptoms are liable to escape notice unless hunted for. They are sella changes, adiposity, hyper- or hypotrichosis, genital atrophy, impotence, amenorrhea, carbohydrate intolerance, endocrin blood changes characterized by an increased number of white blood cells, diminution in polynuclears and a mononucleosis or increase in the number of lymphocytes, and the absence or presence of a large number of eosinophiles.

In addition, there are the symptoms of low blood pressure, slow pulse and dryness or perhaps excessive wetness of the skin.

In hunting for such groups of symptoms, it must be borne in mind that there may be pluraglandular disturbance and that the thyroid, the pineal gland, and perhaps the suprarenal glands must be investigated.

Finally, one can say that there is no glandular organ whose disturbed function is so often associated with marked drowsiness and somnolence as the pituitary (15 per cent to 20 per cent of ordinary cases), and such somnolence can occur in cases in which the gland disorder is not associated with symptoms of neighborhood tumor invasion or general brain pressure.

The somnolence of hypophyseal disorders is especially due to deficient action of the posterior lobe associated with some disturbed functioning of the anterior lobe.

So that morbid somnolence, so far as it is hypophyseal, is probably due to defective action of the whole gland.

Sleep is a biological phenomenon which needs to be explained only as the waking state, or the diastole and systole of the heart need to be explained. It is not forced upon the system by any special hypnotizing secretion. It is part of the inherent and rhythmic habit of living tissue.

In sleep there is a blocking of the sensory inflow and of many association

[1] *Med. Rec.*, Jan. 1, 1916.

paths. Hence we might expect drowsiness from pressure on great sensory stations like the optic thalami.

This nerve block is caused ordinarily and in part by fatigue products acting on the neurons. The activity of such product is perhaps antagonized by the pituitary secretion (Gemelli).

If this pituitary secretion is lessened as in disease the blocking action of fatigue products is greater and morbid somnolence occurs.

With or without such a hypothesis, we are justified in paying closer attention to the endocrin glands in their relation to morbid somnolence.

Treatment.—The indications for treatment are obviously given by the underlying cause. Drowsiness from gormandizing demands dieting and exercise.

Delirium

Delirium may be defined as a disturbance of the cerebral functions, manifested in the impaired action of the nerve centers, characterized by hallucinations, incoherence of speech, a staggering gait, etc. There is dissolution of the "ego" for the time being. It may be due to high fever or to the *poison* causing the fever, as in typhoid or scarlet fever. In such cases it has no important significance *beyond denoting a severe infection.* It may appear before and after the crisis, and may be a *sign of weakness and collapse* (inanition of the brain).

The delirium from toxemia may be mistaken for meningitis. Delirium from alcoholic poisoning may be acute or it may be due to chronic alcoholism, as in delirium tremens.

Various forms of *functional* and *organic* nervous and mental disease may be accompanied by delirium or maniacal attacks.

Treatment.—When active delirium is due to *toxemia,* with a *high temperature,* hydrotherapeutic measures are indicated. When there is the low, muttering delirium of excessive weakness or collapse, active stimulation is indicated.

The patient should be confined to bed in a quiet, dark room, and kept from all excitement and irritation, on a fluid or semifluid diet, plentifully supplied, given by means of gavage if necessary. Heart stimulants are usually indicated. Lavage of the bowel and sponging often produce a good reaction and sleep; the latter may be induced, if necessary, by paraldehyd or sulphonal (gr. xv), chloral hydrate (gr. v to xv), or hyoscin (gr. 1/100) subcutaneously. In prolonged active and violent delirium spinal puncture is indicated.

Night Terrors and Day Terrors in Children

These may be designated as anxiety neuroses. In the majority of cases the mothers are neurotic and the children receive much more attention than they normally should.

Such mothers keep their offspring perpetually dependent, instead of

letting them do things for themselves and bringing them up with a view of developing their own independence.

Such children are abnormally unsocial and should be urged to play more with other children in order to become normal (kindergarten).

Treatment.—Regulation of diet, hydrotherapeutic measures—bowel regulation and firmness in management, are the corrective factors in this class of cases.

Investigation and correction of the following conditions are called for:

1. Adenoids and enlarged tonsils, with consequent partial asphyxiation.
2. Large or indigestible meals eaten shortly before going to bed.
3. The telling of harrowing or terrifying stories—like ghost stories.
4. Masturbation.

Hypnotism, or Suggestion—Trance

Hypnotism may be defined as an abnormal mental insensibility to most of the sense impressions and excessive sensibility to some impressions. There is a certain amount of unconsciousness and an obedience to the suggestion of the one who has induced the condition. It may be regarded as an artificial catalepsy.

The power which one person has over himself and over another, to make himself or another do or believe a thing, is a form of hypnotism or suggestion. When the physician enters a sick room, sympathetic and in a cheerful mood, he knows his power of making his patient comfortable by assurances of an improved condition and by removing from the mind unhappy and sad thoughts. This is a form of hypnotism or suggestion.

Many people are using this power of suggestion, consciously and unconsciously, and have been for centuries. Parents, teachers, ministers, employers, and physicians are constantly using suggestion, but few of them could define it or few use it scientifically. It does not take a pathological mind or a pathological nervous condition to receive suggestion. Charlatans have done an infinite amount of harm through a knowledge of this power.

As we look back over centuries of history of all countries, we may, understanding the power of suggestion, appreciate the many sects, cults, and societies which have had their origin in some minds conscious of this power. The present time is replete with examples. A number of scientific men have investigated the subject and have learned a great deal. But there is still much that we do not understand.

Hypnotism with partial or complete suppression of consciousness is the condition which we usually understand by the word. Professor Bernheim says that the majority of people of both sexes and of all ages and temperaments can be put into the hypnotic condition. Others maintain that only hysterical people and people whose nervous system is not in a proper equilibrium can be hypnotized. Bernheim maintains that the profound

sleep which may be induced by suggestion is not a pathological condition or a neurosis analogous to hysteria.

There are different methods of inducing the hypnotic condition. One is to have the patient fix his eyes on a bright object, in a manner to tire the eye muscles, and, on the operator's suggesting sleep, the patient closes his eyes from fatigue, and soon is asleep, or in the hypnotic condition. Bernheim's method is to assure his patients that there is nothing occult or mysterious in hypnotism, that it is not harmful or unnatural to produce this sleep, and, in order to reassure his patient, he hypnotizes one or two patients in his presence. After assuring him and making him believe that he can be cured or benefited by such procedures, he gains his coöperation and assistance, and puts him to sleep, by merely talking to him in a monotonous, sleepy manner, sometimes with the assistance of passes before the face and having him fix his gaze on an object, with the purpose of tiring the eyes.

He describes nine degrees of intensity of the hypnotic condition. There is comprised in these degrees phenomena extending from a simple numbness in the simplest forms up to entire unconsciousness of what has transpired during the hypnotic condition, catalepsy, automatic movements, contractures, hypnotic hallucinations, and posthypnotic suggestions.

The *clinical symptoms* which can be cured are mainly neurotic and hysterical, but in the larger cities we see such a number of such cases that the value of hypnotic suggestion is apparent. The marvelous sudden cures of paralyses and other conditions, as at Lourdes and by those so called "healers," are probably all hysterical conditions and the healing power is suggestion.

Treatment.—Persons who have lost control of themselves, and are under the hypnotic influence of other persons, but who desire during their lucid states to free themselves and guard against the domination by the will of those who control them, may be cured. The hypnotized subject should be placed under the care of a person with strong mind and sound moral principles, who will explain to the subject the manner in which domination was acquired over the subject by the hypnotizer. Then the subject should be told that it depends upon his own will, exercised during the lucid state, not to be again subjected to the influence of the one who has hypnotized him or any other who would hypnotize him. He should be told to charge himself not to become unconscious, and not to give way to suggestions even if he passes naturally into the unconscious state. He must be taught to assert his own individuality and to affirm mentally at all times his right to determine for himself what he is to do, or to omit, and to resist any interference, when he believes that control from the outside is attempted. Hygienic living and the application of hydrotherapeutic measures will aid in establishing the normal.

Vasomotor and Trophic Disturbances

General Remarks

The nutrition of a part is governed by the nervous system. A disturbance of this part of the nervous system results in disorders designated as trophic disturbances or trophic neuroses. Hypertrophy or atrophy of nerves, muscles, and cutaneous and mucous tissues, joint degeneration, and various skin eruptions are examples of trophic neuroses. If joints are affected, we speak of *arthropathies;* if muscles, *atrophies, hypertrophies,* and *dystrophies;* if nerves, *degeneration;* if fat is substituted for atrophy, or associated with atrophy, we call it *lipomatosis* or *fatty degeneration,* as in some dystrophies. Herpes, pemphigus, and other eruptions, pigmentation, leukoderma, non-parasitic alopecia, and bedsores are examples of trophoneuroses of the skin.

The nerves which supply the blood vessels and the glands may be affected, and produce a variety of symptoms. Vessels and glands may be affected separately, but usually both are affected by the same neurosis.

Angioneurosis designates a disorder of the vasomotor center and nerves. *Angiospasm* is applied to the condition where there is a spasmodic contraction of the muscular coats of the arteries with an increase in the vasomotor tone. *Angioparalysis* represents an opposite condition. Pallor and coolness, and flushing, and heat are the results of such conditions of spasm and paralysis.

Secretory Neuroses.—The skin is the part of the body which most often shows this disturbance.

Hyperidrosis is an excessive sweating. *Anidrosis* is an excessive dryness. *Paridrosis* is a perversion of the perspiratory secretion. We may notice peculiar odors and colors to the perspiration. *Hemidrosis* is bloody sweating.

Raynaud's Disease

Etiology.—This is a rare disorder, probably due to a vasomotor disturbance. It occurs most often in children and young women. Anemia, chlorosis, and neurasthenic conditions seem to create a predisposition. Malarial infection, acute infectious fevers, menstrual disorders, fright, and occupations that lead to exposure, such as washing, seem to be exciting causes. Diabetes and syphilis are underlying causes.

Symptoms.—The disease comes on rather suddenly and affects most often two or three fingers of both hands. There are three grades of intensity:

1. *Local syncope* is the most common form. There are coldness and

pallor of the extremities (called "dead fingers" or "dead toes") which can be induced by cold or emotions. The affected parts are stiff and sometimes painful. There is a waxy pallor; the skin looks shrunken, and there is slight anesthesia. After a few hours this passes away but returns again and may become almost a constant condition.

2. *Local asphyxia* may succeed these conditions, or the disease may appear first in this manner. The affected parts, fingers, toes, ears, and nose, become livid and cyanosed. There are numbness, swelling, and some pain. The capillary circulation is exceedingly sluggish. Upon the attack wearing off, the parts become bright red from the overactive circulation. Local gangrene may follow severe attacks. Recurrences are common, especially during cold weather. There may be much pain in this stage, but no anesthesia. Gangrene may follow.

3. *Local or Symmetrical Gangrene.*—Spots of ecchymosis and vesicles appear, and at these points a symmetrical gangrene develops. The ears, fingers, and toes are the usual situations. Usually the part becoming gangrenous is small, and when it heals it leaves a scar. Rarely the whole tip of the finger or toe may be involved and separated. Purpura hemorrhagica, intermittent hemoglobinuria, peripheral neuritis, and a variety of mental and cerebral symptoms may complicate the disease. The gangrenous stage lasts about three weeks.

Diagnosis.—We have to distinguish from frostbite, senile gangrene, ergot poisoning, alcoholic neuritis, endarteritis, and obstruction of the nutrient vessels.

Prognosis.—The prognosis is good except where there is extensive gangrene and in the gangrenous cases complicated by purpura hemorrhagica, etc.

Treatment.—Avoid exposure to extreme cold. If possible, spend the winters in a warm climate. Galvanism to the spine and limbs, warm applications, anodynes, and tonics are indicated. Internal medication seems to do no good, but we may try nitroglycerin, the iodids, chloral and glandular preparations. A positive Wassermann test indicates antiluetic treatment.

Erythromelalgia

Etiology and Symptoms.—Erythromelalgia is a very rare chronic disease characterized by severe pain, flushing, and local fever, usually in one or more extremities. The pain is intensified if the part hangs down. It affects the feet chiefly. It occurs usually in men of middle life after a low fever or severe physical exertion on the feet. It is rarely found in children.

The disease develops gradually from dull pain, worse at night, in the ball of the foot to an almost continuous pain of the whole region supplied by the plantar nerve. The affected part later assumes a dull, dusky, mottled redness. The congestion and pain usually disappear when the part

is in a horizontal position. Although the disease is not necessarily fatal, it makes life miserable.

Diagnosis.—The diagnosis is to be made from alcoholic and gouty paresthesiae, podalgia, local diseases of the bone and ligaments, and reflex pains.

Treatment.—Treatment is very unsatisfactory as to cure. Temporary relief is obtained by elevation of the feet and applications of cold. Faradization has helped in some cases. Rest, bandaging, cold, anodyne applications, hydrotherapy, tonics, and internal secretions may be tried. If a Wassermann test is positive antiluetic treatment is indicated.

Facial Hemi-atrophy

Etiology and Symptoms.—Facial hemi-atrophy is a rare condition, often congenital, usually beginning in childhood, and characterized by atrophy of one-half of the face.

Symptoms.—In childhood, usually, a small area of atrophy begins on the cheek or chin and gradually spreads so as to involve one-half of the face and scalp, being sharply limited at the median line. Although the change in the muscles is slight, the bones and other deeper structures share in the atrophy. Pains and peculiar sensations may be present at first. The tongue and palate may show atrophy on one side. The left side of the face is most often involved.

Fig. 167.—Left Facial Hemi-atrophy. (After Strümpell, "Text-book of Medicine.")

Prognosis. — Recovery has never been seen, but the disease is not serious as to life. It progresses slowly, but the process may be arrested at any time.

Treatment.—General hygienic measures—massage and tonic medication—are indicated. A positive Wassermann test indicates antiluetic management. A polyglandular preparation may be tried.

Scleroderma

Scleroderma is a trophic disturbance of the skin—mostly in the nature of hyperplasia—which occurs in three forms, namely, the *edematous,* the

indurative, and the *atrophic.* It is often associated with Raynaud's disease and other disturbances of neurogenic origin.

Treatment.—The treatment is that of the associated condition. Massage and lanolin inunctions are of value in relieving the tension.

A positive Wassermann test indicates antiluetic treatment.

Glandular preparations should be tried.

Ulcus perforans

Ulcus perforans is a painless ulcer or sinus, usually on the ball of the great toe or under the little toe, due to trophic disturbances.

Treatment.—Curetting and the routine surgical measures are rarely of much use. Occasionally amputation becomes necessary.

A positive Wassermann reaction indicates antiluetic treatment.

Angioneurotic Edema

Angioneurotic edema is a transient, recurring and usually painless edematous swelling of one or both hands, feet or the face, probably of neurotic vasomotor or anaphylactic origin. Sudden edema of the larynx may prove fatal.

Treatment.—General tonics, such as strychnin, and massage may be of benefit, but no remedy has been found to have a lasting or decided effect.

Internal secretion therapy may be tried and a Wassermann test should be made. Also a scratch test for food allergy is advisable. (*See* Section I.)

Herpes zoster

(*Shingles*)

Herpes zoster is a unilateral vesicular eruption due to a trophic disturbance of the skin. The vesicles are on a highly inflamed base and usually occur along the course of a nerve and are accompanied by a good deal of neuralgia.

Treatment.—In addition to the general treatment of neuralgia, mentioned under that heading, zinc oxid ointment or one of the following may be applied for the early, wet stage:

℞	Plumbi acetici	ʒss	2,0
	Pulv. camphorae	grs. xv	1,0
	Ol. amygdal	ʒii	60,0
	Cerati flav	ʒi	30,0

M. S. Apply over the affected side.

If there is severe itching, the following is a good ointment:

℞	Amyli	ʒii	8,0
	Acidi borici	ʒss	2,0
	Cocain	grs. iv	0,25
	Ung. zinci oxidati ad	℥i	30,0
M.			

If infected, the vesicles should be opened and cleansed with a 1 to 5,000 sublimate solution. Later, a dusting powder, either one of the following, may be used to advantage:

℞	Hydr. chlor. mitis	grs. xv	1,0
	Pulv. tragacanth	℥i	30,0
M.			

℞	Ac. salicyl	grs. x	0,6
	Zinci oleat	℥i	30,0
M.			

Meningitis and Hydrocephalus

Meningitis

General Diagnostic and Therapeutic Remarks

The meninges respond to irritation like other serous membranes, and may become the seat of primary or secondary inflammation, accompanied by serous or purulent effusion. The same species of microbe which produces a pneumonia or pleurisy may start a meningitis or synovitis, according to its localization. The infecting agent may reach the meninges through the blood, or by extension from the nasopharynx, the ear, or the eye. Meningeal symptoms, such as delirium and slight rigidity of the neck, are often observed in acute infectious diseases. These are toxic (toxemia) phenomena, and must not be confounded with true meningitis.

The ordinary clinical varieties are:

1. Leptomeningitis (acute and chronic).
2. Tuberculous
3. Cerebrospinal } Meningitis.
4. Pachymeningitis (acute and chronic).

Differential Diagnosis.—In discriminating between the various forms of meningitis, it will be well if we bear in mind that all the symptoms spoken of are the usual ones of a group of pathological conditions which we class under the heading of *encephalomeningitis,* whose etiology embraces a variety of causes:

1. Primary microbial infection, including the tuberculous variety. 2. Secondary microbial infection, following any form of acute or chronic infection, including syphilis and favored by alcoholism. 3. Extension of a neighboring inflammatory process of the ear or nose, panophthalmitis, intracranial abscess, tumors, etc.

Symptoms and Signs of Meningitis in General.—The symptoms are general malaise, drowsiness, vomiting, constipation, stiff neck and back, loss of control of the bladder and rectum, convulsions, dilirium, coma, and set eyes.

The temperature ranges from 101° to 105°, 106°, 107° F., or higher. The pulse at first is rapid, then irregular and slow. Cheyne-Stokes respiration is often seen.

When we are face to face with illness in which meningeal symptoms are noticeable, the first practical and important point is to decide whether or not there is meningitis. The question cannot be decided by taking into consideration any group of symptoms. A careful weighing of all the evidence is necessary.

Vomiting, delirium, muscular rigidity, as symptoms of toxemia, are just as pronounced in some cases of pneumonia, influenza, or eruptive fevers as in acute true cerebral or spinal meningitis. Malaise, vomiting, constipation, low muttering, grinding of the teeth in sleep, injected conjunctiva, irregularity of the pulse, and sighing respiration are symptoms of long standing intestinal inertia and auto-infection, as well as symptoms of tuberculous meningitis.

In meningitis we can generally elicit the *tâche méningitique,* or Trousseau's sign, by drawing the finger nail sharply over the skin. Owing to vasomotor disturbances the red irritation mark comes slowly and disappears slowly.

Kernig's Sign.—In cases of meningitis it is usually impossible for a patient lying on his back to flex the thighs upon the body without flexing the knee at the same time, and complete extension of the legs is impossible.

Both Trousseau's and Kernig's sign are occasionally found in patients not suffering from meningitis, and their absence does not positively exclude the diagnosis of meningitis. For other signs of meningitis see Section I.

Spinal Puncture.—The cerebrospinal fluid obtained by puncturing the spine is cloudy or turbid in acute meningitis. In several cases of meningitis the writer has withdrawn pure pus by spinal puncture repeatedly.

In tuberculous meningitis the fluid is very clear. The tubercle bacilli can be found in the fluid by microscopical examination. If not found but present, they are detected by the culture and inoculation tests.

Treatment of Meningitis in General.—Order an ice coil to the head, warm mustard baths, and cool sponge baths; fever diet (milk, gruels,

broths, tea, beef tea, and eggs); inunctions of mercurial or Credé's ointment, 3i twice daily; a daily enema of soap water or salt water, one ounce to one pint; catheterism of the bladder in cases of retention of urine; feeding by gavage in coma; feeding per rectum; spinal puncture to relieve pressure symptoms; stimulation p. r. n. or sedatives; and tincture of iodin to check vomiting, one drop in sweetened peppermint water every two or three hours. Intravenous injections of magnesium sulphate and neosalvarsan in meningitis are elsewhere noted (*see* Section II).

Local Treatment.—In tuberculous meningitis local treatment has been attempted by the author by injecting iodoform, potassium iodid, and sodium salicylate into the subarachnoid space without beneficial results. Also tuberculin injections (intraspinally) have not cured. Flexner's Serum is injected into the subarachnoid space in cerebrospinal meningitis.

Acute Leptomeningitis in Adults and Children

Etiology.—A germ infection is regularly at the bottom of inflammations of the pia. It occurs as the characteristic lesion in the epidemic cerebrospinal meningitis. The more common way of infection is secondary through some purulent process of contiguous parts or from distant parts through the circulation.

1. *Primary Form.*—The origin is not known.

2. *Direct extension* may follow an inflammation or injury of the bones of the skull, dura, or orbital cavity. Middle ear disease, with necrosis of the petrous portion of the temporal bone, is the most frequent cause. An infection through the cavernous sinus, from phlebitis arising from suppuration of the orbit or cheek, may be a source. From a disease of the nose causing frontal sinus suppuration or necrosis of the cribriform plate the infection may travel to the meninges. Germs may also travel along the nerve sheaths during the course of facial erysipelas.

3. *Through the arteries* infection may be carried during pyemia, from an abscess of the lung or from malignant endocarditis. Infection may take place during the course of infectious diseases—pneumonia, rheumatism, and the exanthemata, but especially during pneumonia, erysipelas, or septicemia. Bright's disease and gout seem to favor meningeal infection, and it may be a terminal infection in these, as also in arteriosclerosis, heart disease, and the wasting diseases of children. There is a predisposition from the congestion which follows sunstroke.

Pathology.—We distinguish two forms: cellular and exudative. *Cellular meningitis* shows the pia congested, dry, and lusterless, with cellular infiltration of its substance. No exudate is present. *Exudative meningitis* shows throughout the thickened pia, within the meshes, collections of fibrin, serum, and pus. Occasionally the exudate collects on the surface. The ventricles are likely to become inflamed and distended in children and

young adults. By direct extension, there may occur inflammation of the pia mater of the spinal cord. There are likely to be different inflamed areas according to the mode of infection. With middle ear disease the process is over the temporosphenoidal lobe of one side. With pneumonia and malignant endocarditis the process is likely to be bilateral and limited to the cortex. In other cases the base of the brain alone may be involved. When the ventricles are involved, the distention from inflammatory exudation may persist for some time.

Symptoms.—Prodromal.—These are conjunctivitis, headache, irritability of temper, sleeplessness, nausea, vomiting, and general malaise. The invasion may be more sudden, with fever, headache, convulsions, delirium, and vomiting. After the disease is established we observe the symptoms of *brain irritation*. The temperature varies, with irregular remissions. The headache is continuous and severe. Restlessness and stupor are the most pronounced symptoms throughout the disease. One or the other may predominate, and they may alternate. All degrees of each are seen. Supersensitiveness, localized or general, may be severe. Tenderness and stiffness of the muscles of the neck are present if the inflammation extends down to the pia mater of the cord. Involuntary contractions of groups of muscles, especially those of the face, are often present. Sometimes there may be convulsions, unilateral or general.

The roots of the cranial nerves may be involved in the inflammatory process, and as they become affected, we observe symptoms of their irritation, such as photophobia, blindness, strabismus, painful hearing, and deafness.

Vomiting may continue, or it may not appear until later. The tongue is coated and dry in the severe cases. Usually the patient is constipated, but there may be diarrhea and involuntary movements in the last days of fatal cases. The quantity of urine is diminished and it is likely to contain casts and albumin. The pulse is rapid with cortical irritation.

The symptoms of *brain compression* follow. These are due both to the thickening of the pia and to distention of the ventricles. There are dullness, apathy, and blunting of the special senses. Stupor and coma are more likely to be seen than restlessness. There may be paralyses now of groups of muscles, or general paralysis. The pulse is now slowed and may be irregular. The coma becomes profound, the paralysis more marked, and in the latest stages the pulse becomes rapid and feeble, while the breathing may be of the Cheyne-Stokes variety.

In children there may be the same course as in adults, but from the greater likelihood of distention of the lateral ventricles, the symptoms may differ. Some children have for the principal symptoms fever and alternating convulsions and stupor. In others the course is like that of tuberculous meningitis.

When the inflammation is secondary to otitis or a similar preceding

condition, or when it complicates some general infection, we observe the symptoms of these affections first, with the meningeal symptoms developing later. We must remember, however, that there may be complicating cerebral symptoms (*pseudomeningitis*) without meningitis, and the only difference between these and those of meningitis is that the latter are more marked and severe.

The *duration* is ordinarily from one to two weeks, but we may have cases lasting from thirty-six hours to four weeks.

Prognosis.—The prognosis is bad, but not hopeless.

Treatment.—Prophylaxis consists in the *proper management of middle ear disease and diseases of the face, orbit, and nose.* After the disease is established, diminish the severity of the inflammation in the early stages, alleviate the pain, and give sufficient nourishment.

Cold should be continuously applied to the head by means of a coil or ice cap. Bloodletting from the temples and back of the neck and the application of leeches behind the ears is indicated in the early stages. Calomel and magnesium sulphate at the outset, in sufficiently large doses to move the bowels freely, reduce the meningeal congestion. Ergot and potassium iodid are also used to reduce the congestion. An intravenous injection of magnesium sulphate is a rational and harmless procedure in septic meningitis (*see* Septicemia, Section II).

The headache and restlessness may be controlled by opium, phenacetin, chloral, bromid of sodium, and sulphonal. The patient should be kept quiet, free from noise, and in a darkened room. Operative interference should be practiced in the cases where an abscess can be localized, or when decompression is urgently desired.

Chronic Meningitis (Chronic Leptomeningitis) in Adults and Children

Chronic meningitis is a rare disease. It is seen in middle age and in those who have been deprived of the necessities of life and much exposed. Tramps and the inhabitants of almshouses are among those affected. Alcoholism and cerebral endarteritis seem to lead to the disease. It may complicate chronic Bright's disease, chronic degenerations of the brain, slow growing cerebral tumors, chronic pachymeningitis, or fractures and inflammations of the cranial bones.

Pathology.—The pia mater, in parts or as a whole, may be thickened, opaque, edematous, and infiltrated with cells. Adhesions may be present between the pia and dura, and the cortical portion of the brain may show softening or sclerosis. The ependyma of the ventricles may be thickened and roughened, and the ventricles themselves dilated and distended with serum.

Symptoms.—The symptoms resemble those of chronic pachymeningitis, although hemorrhages do not occur. They are those of brain compression.

At first they are obscure and intermittent, making the diagnosis difficult and sometimes impossible.

Prognosis.—The prognosis is not good and recovery cannot be expected. The disease extends over a number of years and results in insanity, or else the patients die with marked cerebral symptoms or in a condition of exhaustion and emaciation.

Treatment.—Patients should be given the benefit of doubt as regards syphilis by a course of a treatment with mercury, salvarsan and iodid of potassium. Otherwise we can only alleviate the symptoms.

Acute External Pachymeningitis

This form, which is rare, is secondary to cranial bone disease and to suppurations of the middle ear and mastoid. It may be due to syphilis.

Prognosis.—The prognosis is good, if the pia or the sinuses are not involved, and if the treatment is proper.

Treatment.—The treatment is surgical.

Chronic Internal Pachymeningitis

(*Hemorrhagic Pachymeningitis; Hematoma of the Dura mater*)

This disease is not common in general practice, but is not uncommon in insanity and degenerative diseases of the brain. Most of the subjects have been alcoholics, and it is almost exclusively found among tramps and almshouse inmates. There may be symptoms of slow or sudden compression. The prognosis should be guarded.

Spinal Pachymeningitis

(*Pachymeningitis externa spinalis*)

This form may be acute or chronic.

Etiology.—The acute form is due to an extension of a neighboring abscess or of an inflammation of a vertebral bone. The chronic form is almost always tuberculous, and is an extension of a tuberculous process in a vertebra.

Symptoms.—We observe irritation and compression of the anterior and posterior nerve roots of the cord, causing hyperesthesia, motor spasms, anesthesia, paralysis, atrophy of muscles, and loss of reflexes. The later compression of the cord itself causes loss of motion and loss of sensation below the level of the lesion.

Treatment.—The treatment is symptomatic or surgical.

Pachymeningitis interna hemorrhagica spinalis

The lesions of this disease of the spinal meninges are identical with those of the cerebral meninges in the same disease, and the two are usually

associated. That portion of the meninges close to the cerebral meninges is usually affected. We find pain in the back and motor and sensory irritation and impairment. Sudden exacerbations may occur from time to time, due to hemorrhages with compression.

Treatment does no good.

Pachymeningitis interna hypertrophica spinalis

Pathology.—The dura changes into a thick, fibrous tissue. This at first irritates the nerve roots, then destroys them, and compresses the cord. The process is usually found in the cervical region, and surrounds the cord like a ring.

Symptoms.—During the stage of irritation of the anterior and posterior nerve roots, there are neuralgic pains along their course, referred to the neck, the arms, and the upper portion of the thorax. Hyperesthesia, tingling, spasm, and rigidity also occur in these regions. During the stage of destruction of the nerve roots and pressure on the cord, there are anesthesia, paralysis, atrophy, and loss of reflexes. The location of these symptoms depends upon that of the lesion.

Prognosis.—The prognosis, as to recovery, is bad, but death is usually due to some other disease. Occasionally the disease is arrested, and although there are deforming contractures, the patient may live for years.

Treatment.—In addition to potassium iodid, we may employ counter-irritation and vibration to the diseased portion of the spine.

Cerebrospinal Meningitis in Adults and Children

(*Cerebrospinal Fever, Malignant Purpuric Fever, Petechial Fever*)

This is an infectious disease caused by the *Diplococcus intracellularis.* It may occur epidemically or sporadically, and is characterized by an inflammation of the cerebrospinal meninges.

Etiology.—Although the *Diplococcus intracellularis* is recognized as the cause of the inflammation, the manner in which it enters the system is unknown. The epidemic form occurs in certain regions, seldom widespread, and more often in the country than in the city. Winter and spring are the seasons when the outbreaks have taken place, and poor hygiene, crowding together of people, overexertion, long marches in the heat, and depressing mental and physical surroundings seem to be predisposing factors. Recruits, young soldiers in barracks, children, and young adults are most often affected. The disease does not seem to be very contagious, and it is very rare to have more than one case in a house. The sporadic form occurs in both the city and the country.

Pathology.—In the brain the usual changes found in the acute cases are congestion, the veins and sinuses being gorged with blood, and more or less

infiltration of the pia mater with an exudate of fibrin, serum, and pus. We may find this infiltration confined to the base or more generally distributed. Along the course of the blood vessels and in the sulci the exudate is more abundant. We find the lateral ventricles filled with serum or a seropurulent exudation. This may distend the ventricles, particularly in children, and continue to do so after the inflammation has subsided, in chronic cases, constituting chronic hydrocephalus. In malignant cases we may find merely extreme congestion. We often find the brain cortex infiltrated with pus, leading to small abscesses. The cranial nerve sheaths, particularly those of the second, fifth, seventh, and eighth nerves, being involved in the process, may lead to neuritis and perineuritis.

The pia mater of the cord shows similar changes, which, from gravity,

Fig. 168.—Meningitis (Rockefeller Institute).

are found particularly on the posterior aspect of the cord. The cerebrospinal fluid, usually increased in amount, may be turbid and contain the *Diplococcus intracellularis,* as well as frequently other pyogenic cocci.

The nature of the inflammation is sometimes productive in character, and then there is no serum, fibrin, or pus. The pia mater in these cases may look normal, or it may be lusterless or congested. In the cases running a more chronic course we find the meninges thickened, and there are yellow patches which mark the former location of the exudate. Pathological changes in other parts of the body are not peculiar to this disease, as they are either common to all infectious diseases or due to some complication.

Symptoms.—Malignant Form.—The onset is sudden, with a chill, headache, high or moderate fever, somnolence, muscular spasms, and great depression. The pulse is feeble and frequently slow. Hemorrhagic spots usually appear on the skin. The cerebral symptoms develop rapidly. Death may occur in a few days. Although this severe form is usually seen in epidemics, it may occur sporadically.

Ordinary Form.—The incubation period is not certainly known, but there may be general malaise for a few hours or days. Usually the onset is sudden, with headache, chill, fever, and vomiting. The fever is variable,

but usually only moderate, from 101° to 104° F. The pulse is usually full and strong, although a high temperature may be associated with a rapid pulse. It varies greatly. The headache is a prominent symptom and is severe. It is usually occipital, but may be parietal, frontal, or general. The pain extends into the back of the neck and may extend into the trunk. There may be areas of exquisite hyperesthesia, and particularly there is sensitiveness along the spine. General pains in the bones or muscles are noticed. Vomiting is a severe and distressing symptom, and it has no relation to ingestion of food or drink. It may be projectile in character.

The nervous symptoms of *irritation* are prominent. One of the im-

FIG. 169.—MENINGITIS. CHARACTERISTIC POSTURE DURING SPASM.

portant early symptoms is a painful stiffness of the muscles of the neck. Opisthotonós may be present, but it is more common to observe orthotonos. The slight forward bending of the head, the "cranelike neck," has recently been mentioned as a diagnostic symptom. Twitchings and spasms of the muscles and automatic movements of the muscles of the arms or legs are frequent. *Kernig's sign* is usually present. It consists in the inability to extend the leg to a straight line on the thigh when the thigh is held at right angles to the body. It occurs usually in cases of meningitis. Babinsky's reflex is often present, but it may be present in other conditions. It is obtained by stroking the sole of the foot, which causes extension of the great toe. In health this irritation will cause flexion of the great and second toes or a rapid withdrawal of the whole foot and leg. It is characteristic to observe exaggerated reflexes.

Irritation of the cranial nerves causes photophobia, often associated with conjunctivitis, intolerance to noises, facial neuralgia, and facial twitchings.

For psychical symptoms, we observe delirium, which may be maniacal. Morbid erotic desires may be present, and from time to time there may be a sudden sharp cry, the "hydrocephalic cry."

Eruptions on the skin are not at all regular. There may be herpes on

the lips or face, the serum of which may contain the bacteria causing the disease. Erythematous blotches, urticaria, or petechical spots may be present.

Albumin and casts are usually found in the urine, and polyuria and glycosuria have been present in some cases.

The bowels are usually very constipated, but a few cases have been seen with dysentery. The "boat-shaped" abdomen, due to marked retraction of the abdominal muscles, is often noted. Some patients have severe abdominal pain.

Leukocytosis is an early and constant feature. The white blood cells average from 25,000 to 40,000 to the cubic millimeter.

Later in the disease we note the symptoms of pressure. There is no complaint of headache, but from the moanings and motions we know that it is present. Dullness and apathy increase to stupor and coma. However, there may be periods of low muttering delirium. Photophobia is succeeded by the inability to perceive light. The pupils are usually dilated; no attention is paid to noises; muscular weakness and paralysis succeed the twitchings, and this is most marked in the face and eye muscles, causing strabismus. The temperature continues irregular; the pulse is usually slow, but toward the end becomes rapid and feeble; the respiration may be irregular or of the Cheyne-Stokes variety. Toward the end there may be diarrhea and loss of control of the sphincters. There may be an ante mortem hyperpyrexia. Cases recovering exhibit a rapid improvement, but usually a long convalescence characterized by headache, insomnia, weakness and pains in the legs and joints, mental dullness, and sluggishness in movements.

Course.—The course of the disease varies greatly. Some of the patients die within the first five days. If the case is favorable, improvement generally begins in five or six days, and the worst symptoms improve rapidly. Convalescence is very slow and tedious as a rule, and may be interrupted by sequelae and complications.

Anomalous Cases.—

1. In *young babies* convulsions are a prominent symptom throughout the course, the fever is high, the pulse is rapid, and stupor alternates with restlessness. Death takes place in coma.

2. *Mild Cases.*—Headache, nausea, vertigo, a little fever, possibly stiffness of the neck, and vomiting make a form difficult to diagnosticate except during epidemics.

3. *Intermittent Cases.*—In these cases there are periods of improvement and remission of fever which may last from a few hours to a few days. These periods may be regular and make one think of malaria or pyemia.

4. *The abortive cases* begin in the regular way, and seem severe, but

after a few days there is a sudden change for the better and the patient improves rapidly.

5. A *chronic form* has been described as being relatively frequent. An attack may have a most complex symptomatology, lasting five or six months, showing a series of recurrences of fever, and cause severe marasmus. A chronic hydrocephalus or abscesses of the brain may be the cause of this protraction.

Complications.—Lobar pneumonia is a frequent complication, and bronchitis, pleurisy, pericarditis, and parotiditis are not uncommon. Endocarditis is sometimes seen.

We usually see conjunctivitis, but purulent keratitis or choroiditis, with loss of sight, or optic neuritis with atrophy may occur. The eye complications are due to involvement of the nerves, which causes neuritis, or the inflammatory process may travel along the sheath of the optic nerve. Deafness and otitis media with mastoiditis may occur.

Coryza is frequently an early symptom, and occasionally it may precede the meningitis, which might lead us to think that the infection entered through the nasal mucous membrane.

Arthritis occurs in some epidemics. We observe painful, red, swollen joints, with effusion within and around. Sometimes the joint exudate is purulent.

Sequelae.—Chronic hydrocephalus, prolonged prostration, gastric irritability, protracted headache, dilated pupils, mental weakness, forgetfulness, and anemia are seen. A neuritis may result in a paralysis. There may be partial or complete blindness, from atrophy of the optic nerve, corneal ulcerations, or choroiditis. Permanent deafness, and in children deafmutism, may be the result of a meningitis.

Diagnosis.—The most important signs are fever, headache, delirium, retraction of the neck, tremor, and rigidity of the muscles, but we notice these symptoms in some cases of typhoid fever and pneumonia. In some babies with severe bowel troubles we observe symptoms of meningeal irritation.

Kernig's and *Babinsky's* signs have been spoken of. *Brudzinski's sign* is usually present.

Lumbar puncture will furnish us with a specimen of fluid for microscopical examination. There is usually no difficulty in determining between the pneumococcus and the *Diplococcus intracellularis.* If the fluid shows no bacteria, we may inoculate it into a guinea pig. Tuberculosis can thus be diagnosticated.

Method of Procedure in Lumbar Puncture.—The patient is turned on the right side with the back bowed, the knees drawn up, and the left shoulder forward. We may use a local anesthetic or a few whiffs of chloroform. Under the strictest antiseptic precautions, we insert a small aspirating needle or an antitoxin needle about one centimeter to the right or left of

the median line, in the third lumbar interspace, guiding it upward and inward. The needle enters the cord at a variable depth from the surface of the body, according to the age of the individual and the musculature, from 2.5 to 6 centimeters. The fluid runs drop by drop as a rule, and if there is meningitis, it is likely to be turbid, may be purulent, and sometimes is bloody. Even if it is clear, meningitis may be present (*see also* Bedside and Office Technic, Section I).

Prognosis.—The prognosis is bad, but not hopeless. It depends on the severity of the symptoms, especially those of cerebral origin, and also on the character of the epidemic. The mortality in different epidemics ranges from 20 to 75 per cent. The average mortality is about 40 per cent. The death rate is higher in children than in adults. Deep coma, repeated convulsions, and high fever are the pronounced symptoms of fatal cases. A sudden fall in the temperature is of bad omen. The endemic cases are usually not so severe as the epidemic cases.

Prophylaxis.—In times when cerebrospinal fever is prevalent, operations upon the nose and throat should be deferred, if possible.

Patients must be isolated and screened from flies and other insects. All discharges and soiled fabrics must be disinfected or burnt. Attendants upon the sick should practice the *nasopharyngeal toilet* (*see* Bedside and Office Technic). Convalescents, who are apt to be carriers, should have the nasopharynx sprayed with very dilute *chlorin water*.

Treatment (*symptomatic*).—If the patient is robust, local bloodletting by means of leeches applied to the temples or behind the ears, or the application of wet cups to the nape of the neck, is of benefit sometimes. The continuous application of cold by means of the coil or ice bags to the head and spine usually gives relief. Lumbar puncture, if properly done, is harmless and may be of benefit. Hydrotherapy, including warm baths, may be indicated by high temperatures. Potassium iodid is used throughout the disease for its absorbent action. Give 5 to 20 grain doses three times a day. Salicylate of sodium may be given in 10 to 20 grain doses three times a day by mouth or per rectum. The nervous symptoms demand sedatives. Bromid of sodium, hyoscyamin, phenacetin, atropin, and morphin are used. Drug stimulants and enteroclysis must be used where heart weakness is evident. The hypodermic administration of soamin is recommended by English physicians as having specific value.

A nutritious diet, consisting of milk and strong broths during the fever must be maintained. Forced alimentation by means of the stomach tube may be employed in suitable cases.

Specific Treatment.—Flexner's serum is the nearest approach to specific treatment which we have at the present time.

Blood serum from convalescent patients is a future possibility.

Flexner's serum must be injected *intraspinally* to be of value, as follows:

When lumbar puncture in a suspicious case reveals a *cloudy* fluid 15,0 to 45,0 of the warmed serum may be injected under aseptic precautions immediately without waiting for a bacteriological report. The quantity of serum injected should not exceed the quantity of fluid withdrawn. A second dose is given after the laboratory report is confirmative. If the condition is stationary or intensified after twelve hours, another injection is indicated. If diplococci persist after the fourth dose, daily injections are to be administered until the diplococci have disappeared. If fever and mental impairment persist, or if relapses after improvement are in evidence, more serum should be administered, also in the chronic stage of the disease, when diplococci are still in evidence. If on puncture, a thick pus is found to ooze slowly through the trocar, normal saline should be injected for the purpose of washing out the lower part of the canal, after which the serum is introduced.

The Treatment of Cerebrospinal Fever in the British Navy.—H. D. Rolleston says that from the commencement of the war to July 31, 1915, there have been 170 cases of cerebrospinal fever in the British Navy. A summary of the results of treatment is abstracted from the notes of 163 cases, eighty-nine, or 54.6 per cent, of which proved fatal. Various forms and combinations of treatment were employed, and the most noticeable point brought out is the failure of the generally approved intrathecal injection of antimeningococcic serum. The failure of this serum to reduce the mortality was not due to its being given too late, for in 66.7 per cent of the 105 cases (sixty-four, or 61 per cent, died, and forty-one, or 39 per cent, recovered) it was administered within the first three days of the disease. The serum treatment, which was so successful in America (Flexner, Sophian), Belfast (Robb), and elsewhere, was given a thorough trial and has proved most disappointing. In very few instances was there the critical improvement which is said to occur in about 30 per cent of the cases that recover (Flexner). The use of soamin appeared to give good results.

Acute Leptomeningitis spinalis

This is a rare inflammatory disease. It may occur alone, but it is usually seen in *connection with cerebral leptomeningitis.*

Etiology.—As an extension from the brain, it may be a simple or epidemic inflammation. It may result from an injury to the vertebrae, as from an operation. Acute infectious diseases, especially pneumonia, smallpox, scarlet fever, and typhoid fever, may be complicated with this disease. The inflammation may be tuberculous in character. Cases supposed to be due to wet, cold, and insolation are probably due to some germ infection. The germs of epidemic cerebrospinal meningitis may affect the cord alone.

Pathology.—Although the inflammatory process is usually distributed throughout the length of the cord, it may be localized at different levels.

The nature of the exudate depends upon the causative factor. It is usually more abundant at the posterior portion of the cord, owing to the usual position of the patient (in bed, lying on his back). The peripheral portions of the cord are usually infiltrated by the inflammatory products, and the nerve roots are surrounded and compressed by them. Most cases show corresponding lesions in the pia mater of the brain.

Symptoms.—At first we observe the symptoms of irritation of the spinal nerves, pain in the back, pains shooting along the course of the nerves, areas of hyperesthesia, and spasm and rigidity of the muscles supplied by the nerves irritated. We find rigidity of the spine, with the head thrown back, and sometimes opisthotonos. The larynx may be so firmly pressed against the spinal column, from the retraction of the head and neck, as to cause stridor and obstructive dyspnea. There is usually an exaggeration of the reflexes, and there may be retention of urine. There is always an irregular fever, seldom higher than 104° F. When pressure takes place from an accumulation of the inflammatory products, we note anesthesia, complete paralysis, and atrophy. The reflexes are lost, the sphincters are paralyzed, and bedsores may take place.

Prognosis.—The prognosis is not good. It is particularly bad in cases of tuberculous origin and in cases where there are high fever, severe pain, and early paralysis. The acute symptoms may subside and leave a chronic meningitis.

Treatment.—Rest, quiet, leeches along the spine, then hot poultices or ice bags are to be used. Mercurial purges and small doses of potassium iodid or of sulphate of magnesium may be given at short intervals. Later, blisters, counterirritation, and lukewarm baths are indicated.

Tuberculous Meningitis in Adults and Children

(*See also Section V*)

DIFFERENTIAL TABLE

Tuberculous Meningitis	*Simple Meningitis*
History of tuberculosis	History of ear disease, etc.
No apparent cause	Cause evident
Longer prodromal period	Short prodromal period
Longer course	Short course
Presence of tuberculosis in the lungs or elsewhere	No tuberculosis
Heredity in 20 per cent.	No heredity.

Pathology.—The pathological changes in adults are the same as in children, except that in adults it is the exception for the ventricles to be involved. It may be a part of a general tuberculosis, but is usually a local

ized process, either primary or secondary to a focus elsewhere in the body.

Symptoms.—Some cases show only symptoms of the general tuberculosis, although there exists the meningitis. In some cases marked symptoms of meningitis develop suddenly where apparently there has been previous good health. Some of these are undoubtedly primary cases of tuberculous meningitis, while in others there was somewhere in the body a tuberculous focus from which the infection was carried to the head.

If the invasion is sudden, there is a chill, followed by headache, projectile vomiting, and prostration. If the invasion is gradual, there is a little fever, with headache, loss of appetite, and general malaise. When the disease is established, we observe the typical picture described under Acute Meningitis. The symptoms may be severe, and the patients die in from one to two weeks; or they may be less severe, with intervals of improvement, and linger from three to seven weeks. In some cases the meningitis develops during the course of a pulmonary tuberculosis.

Diagnosis.—The diagnosis is confirmed by spinal puncture and laboratory investigation of the fluid.

Prognosis.—The prognosis of tuberculous meningitis is bad, but some patients with these symptoms recover.

Treatment.—The *symptomatic treatment* is the same as for the other acute forms of meningitis.

The *specific treatment* has not as yet been elaborated.

Intraspinal injections of salvarsanized or mercurialized serum should be tried; also intrathecal injections of tuberculin one one-millionth of a milligram.

Syphilitic Meningitis

(*See* Syphilis)

Hydrocephalus

Hydrocephalus may be congenital or acquired. A serous effusion which accompanies meningitis or brain tumor will not be considered in connection with simple hydrocephalus.

It is now well established that the cerebrospinal fluid is a secretion of the choroid plexus. Abnormal accumulations of fluid represent a disturbed balance between secretion and absorption, i. e., hypersecretion, defective absorption, or obstruction to outflow.

Dr. C. H. Frazier [1] of Philadelphia very properly rejects the old classification into internal and external hydrocephalus and suggests a new classification, having a physiologic background with direct clinical application:

I. Hydrocephalus obstructivus.
II. Hydrocephalus nonabsorptus.
III. Hydrocephalus hypersecretivus.

[1] *Amer. Jour. Dis. of Children,* 1915.

IV. Hydrocephalus occultus.

In the *obstructive form*, a congenital defect or an inflammatory obstruction is the etiological factor.

In this *internal or obstructive type*, the absorption of phenolsulphonephthalein from the subarachnoid space and its excretion by the kidney is almost normal.

In the *non-absorptive type* the time of appearance of the dye in the

FIG. 170.—HYDROCEPHALUS.

urine is delayed, or there may be but a trace in the two-hour period

The *hydrocephalus occultus* is that form in which there is an excess of fluid with mild pressure symptoms, but without an increase in cranial dimensions.

For this evanescent form the writer suggests a vasomotor origin as in angioneurotic edema frequently observed in other parts of the body.

Summary of Clinical Tests (according to Frazier).—

First examination:

1. Lumbar puncture.
2. Withdrawal of 1 c.c. of cerebrospinal fluid.

3. Attach 2 c.c. record syringe filled with 1 c.c. neutral solution of dye.
4. Withdraw piston until syringe is full.
5. Inject solution slowly into lumbar subarachnoid space.
6. Withdraw needle.
7. Test urine for phenolsulphonephthalein every five minutes until dye is detected.
8. Estimate total amount of dye excreted in the first two-hour specimen of urine.

Second examination (on the following day, or after dye is no longer found in urine):

1. Puncture of the lateral ventricle.
2. Inject 1 c.c. neutral phenolsulphonephthalein solution.
3. Lumbar puncture. Examine for dye every five minutes until dye appears.
4. Test five-minute specimens of urine.
5. Estimate total amount of dye excreted in first two-hour specimen.
6. In calculations, the amount of dye lost by lumbar puncture must be taken into consideration.

FIG. 171.—HYDROCEPHALUS.

Treatment.—In all cases of hydrocephalus a Wassermann test should be made, and if positive, antiluetic treatment (potassium iodid, mercury, salvarsan) should be administered.

Thyroid and pineal gland therapy, alone or in combination with one another, and possibly in combination with mercury, should be also tried in this class of cases.

In the obstructive type *puncture through an open suture* gives an outlet for the pent-up fluid.

Other surgical procedures, with the object of securing ample drainage of fluid, have so far not been successful.

General hygienic and symptomatic management is indicated in all forms of hydrocephalus.

Sympathetic Nervous System

Lesions of the right and left cervical sympathetic and of the thoracic and abdominal sympathetic give various symptoms such as localized paralysis of face and neck, anginoid attacks, acute stomach dilatation, meteorism, intestinal paralysis, collapse, visceral crises (gastric, intestinal, renal), orthostatic albuminuria, polyuria, transitory glycosuria, paroxysmal dyspnea, local pallor, local cyanosis.

Treatment.—The treatment is that of the underlying condition. The emergency treatment calls for stimulants and sedatives.

Vagotonia

Vagotonia is defined as a morbidly exaggerated tonus in the autonomic nervous system. Its manifestations may be *general,* representing a general nervous or vagotonic disposition, or they may be *local* from irritation of isolated branches of the autonomic system.

Vagotonia is therefore a form of constitutional inferiority which usually improves with advancing age and which may at times disappear and reappear.

In contrast to the *sensory motor nervous system* which serves the senses and muscles controlled by will, the *vegetative nerve system* is made up of nerve fibers which go to organs with smooth muscles—such as the intestines, blood vessels, gland ducts, skin—or to cross striated muscular organs —such as the heart and end of the alimentary canal and muscles of genital apparatus.

Vegetative nerves which arise from the sympathetic are termed *sympathetic;* all other vegetative nerves (vagus extension) are termed *autonomic.*

The *vagus* innervates the *heart, lungs* and *intestinal canal.* Certain drugs stimulate or depress these nerve systems, viz.:

Adrenalin stimulates sympathetic nerve fibers.

Pylocarpin and *physostigmin* stimulate autonomic fibers.

Atropin counteracts this stimulation of the autonomic.

Internal secretions have a regulating or disturbing influence on the autonomic system, the precise nature of which is at present unknown. In constitutional vagotonia we usually find a lymphatic diathesis and persistence of thymus gland.

Symptoms.—The clinical evidence of vagotonia in individuals manifests itself in many ways, such as:

Mild spasm of convergence
Salivation

Tendency to sweating
Dermographism
Cardiac neurosis (vagotonic bradycardia)
Vagotonic goiter heart
Bronchial asthma from vagus stimulation
Laryngospasm
Cardio- and esophagospasm
Vagotonic forms of stomach unrest
Gastrosuccorrhea
Hypersecretion and hyperacidity of stomach
Anesthetic pharynx of vagotonics
Peristaltic unrest of intestine
Diarrhea
Spastic constipation
Mucous colitis (membranous enteritis)
Anal cramps
Erections and pollutions
Spasm of gall-bladder and ducts not due to stone
Reflex anuria
Orthostatic albuminuria
Eosinophilia on the basis of vagotonia.

Prophylaxis.—Inasmuch as a slumbering vagotonic disposition may develop into the active state by reason of overstrain, misfortune, and disappointments, hygienic plain living and avoidance of overstrain should be attempted.

Treatment.—The management of vagotonics is practically the same as for *neurasthenia.*

Atropia is the best antidote for the spastic states, as it reduces the tonus of the vagus nerve.

Endocrin gland therapy for vagotonia awaits development on a practical basis.

In vagotonia with psychasthenia combined, suggestion therapy and well directed efforts of an honest mental healer are salutary.

Disorders of Speech

Stammering—Stuttering—Lisping

When disorders of speech take their origin in the nerve centers, treatment or training will avail but little. When tongue tie, adenoid vegetations, irregular teeth, or cleft palate are causes, the stammering, stuttering, and lisping are easily remedied. Systematic teaching and training may overcome speech defects when they are due to a failure on the part of the vocal organs to coöperate with those of articulation. Tremor following

severe acute illness or nervous shock or overwork or general debility will require constitutional treatment.

Aphasia

Aphasia proper is defined as an impairment or loss of speech due to the loss of memory for vocal or written signs by means of which we exchange ideas.

We also have *aphasia in idiocy, coma, stupor,* and in various forms of *paralysis.*

Types.—The chief types of aphasia are:

1. Auditory aphasia—word deafness.
2. Visual aphasia—word blindness (alexia).
3. Motor aphasia, with or without agraphia.
4. Hysterical aphasia.

Causes.—The common causes of aphasia are embolism, hemorrhage, thrombosis, inflammation, and tumor.

Treatment.—The treatment of aphasia is that of its underlying cause. Vibration, cold douches and electrical stimulation are usually employed.

Dysarthria

Dysarthria is a difficulty in performing the coördinated muscular movements necessary for forming words.

Treatment.—The treatment is that of the underlying cause.

Mutism

Mutism may depend upon absolute deafness, mechanical defects of the speech apparatus, or mental defects.

It is not generally realized how much moderately deaf children are handicapped in the acquisition of language and general information.

A careful examination will reveal the underlying cause of mutism and suggest remedial measures.

Tumors and Abscess of Brain and Cord

Anti-luetic measures are discussed under Syphilis. Symptomatic treatment calls for sedatives. Extirpation of a tumor, evacuation and drainage of an abscess and methods of securing decompression are surgical procedures.

Mental Defects from Arrested Development

Idiocy—Imbecility—Cretinism

The idiot represents the lowest expression of human intelligence. In the scale of mental power and activity the imbecile stands between the idiot and the feeble minded, and about five per cent of imbeciles present

the so called Mongolian type of imbecility. Such conditions are congenital or acquired. Imbeciles and feeble minded children may be developed along the line of their unimpaired faculties by special training if removed from the influence of neurotic parents.

The mentally deficient are divided into the three following classes:

1. Congenital mental deficiency in its various forms of microcephalus, hydrocephalus, the Mongol type, scrofulous cases, birth palsies with athetosis, cretinism, and primarily neurotic cases.

2. Developmental cases.

3. Accidental or acquired cases, consisting of traumatic, postfebrile, emotional, and toxic varieties.

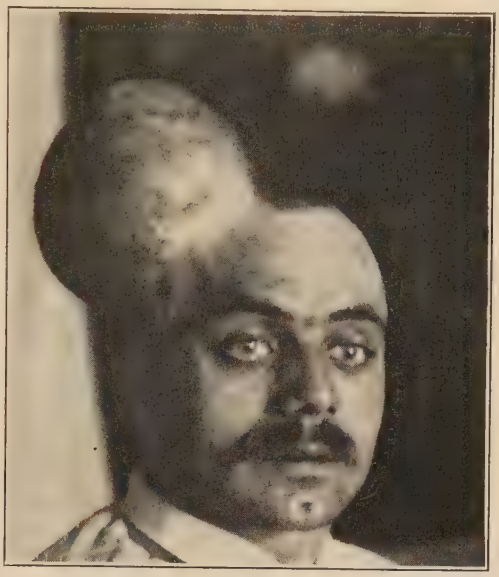


FIG. 172.—TUMOR AND HERNIA OF BRAIN FOLLOWING TRAUMATISM. PARALYSIS. DEATH.

Amaurotic family idiocy is the unfortunate name given to a symptom complex of brain degeneration in which inability to hold the head up and blindness are the marked features. Children so afflicted generally die before the age of two. The treatment is symptomatic and unavailing.

A "clearing house" for mental defectives has been established through the efforts of Dr. Max Schlapp of New York for the purpose of formulating the status and requirements of defectives.

Section XIII

Minor Ailments—Prophylaxis and Treatment with Formulary

A. Alimentary Tract

Upper Alimentary Tract

Cracked Lips.—Cracked lips are frequently caused by the unwonted drying of their surfaces, the habit of biting them, the unaccustomed blowing of wind instruments and the use of unprotected cigarette paper which adheres to the mucous membrane.

Prophylaxis and Treatment.—Prophylactic treatment consists in avoiding the cause and protecting the lips with "cold cream," cocoa butter or lanolin. When the condition persists the use of lunar caustic, glycerite of tannin, or powdered alum will aid in forming a protective covering under which healing can take place. When a general macerated condition of the vermilion border is present, immediate relief will be given by applying the following solution on a pledget of cotton:

℞	Cocain muriat.	gr. iii	0,2
	Morphin sulph.	gr. 1/3	0,02
	Sod. chlorid.	gr. iii	0,2
	Sol. adrenalin. chlorid. (1:1,000)	gtt. viii	0,5
	Aq. destil.	℥iii	90,0

M.

After the lips have become sufficiently anesthetic the patient should slowly open his mouth to its full extent and apply the following paint:

℞	Ac. carbol.	gtt. xx	1,3
	Ol. ricini	gtt. xx	1,3
	Collodii	℥i	30,0

M.

Another useful preparation for this purpose is Co. Tincture of Benzoin.

Excoriation of the Lips.—Excoriation of the lips may have its origin in an acrid nasal discharge—the slobbering accompanying increased salivation, and from irritant tooth and mouth washes. By removing or neutralizing these causes the condition will often cure itself.

Prophylaxis and Treatment.—If, during an attack of coryza, a small piece of absorbent cotton is loosely pushed into each nostril and left there it will offer very little obstruction to respiration and yet give so great a sense of dryness and comfort that much of the blowing and wiping will be obviated.

A handkerchief which has become wet and soiled is a great source of irritation. Instead of blowing the nose the patient should be instructed to dry it by the use of cotton swabs on tooth picks. The cotton on the swab should be so twisted that it remains loose and fluffy at the end. Every two or four hours the nasal secretions can be more thoroughly removed by a douche of sodium bicarbonate in warm water, in the proportion of a heaping teaspoonful to the pint. The irrigation should be given through some apparatus, such as the Birmingham nasal douche, so that the hydrostatic pressure is not raised high enough to force any of the fluid into the eustachian tubes. A more satisfactory cleansing is accomplished if the solution is expelled through the mouth.

All these measures tend to prevent the irritating nasal secretion from reaching the adjacent skin. When the skin has already become inflamed, camphor ice or stearate of zinc may be applied.

Herpes labialis (*Fever Sore*).—Herpes labialis occurs in gastro-enteric disturbances and during the course of many of the infections. The lesion consists of a crop of vesicles containing clear serum on an inflamed base. These disappear in the course of six to ten days by drying up and crusting over. Several crops often succeed one another.

Treatment.—If treatment is called for apply a drying powder like boric acid and starch (equal parts) or camphor ice, or a refrigerant salve like the following:

℞	Menthol	gr. v	0,3
	Phenol	gr. x	0,6
	Ung. aq. rosae	ʒi	30,0

M.

℞	Thymol	gr. v	0,3
	Ol. eucalypti	gr. xv	1,0
	Ung. petrolat.	ʒi	30,0

M.

If there is considerable pain and discomfort the following preparation, to be painted on with a camel's hair brush, will give relief.

℞ Pulv. camphorae 3iiss 10,0
Chloral. hydrat. 3iiss 10,0
M.

Domestic Animal and Insect Bites.—Domestic animal and insect bites occur quite commonly on the lips. The chief offenders are the dog, cat, horse, bee, wasp, spider, and mosquito.

Dog bites and cat bites may be the means of inoculation of hydrophobia virus and horse bites are sometimes followed by tetanus, glanders, and actinomycosis.

Treatment (*see also* Section XIV).—All such lesions should therefore be widely opened immediately, and cauterized with pure carbolic acid followed by alcohol. The wound should not be allowed to close until it is perfectly clean, and frequent washing with peroxid of hydrogen is a good method of attaining this. When obtainable, specific sera may be given as a prophylactic measure against the development of serious complications.

The less poisonous insect bites may be treated by the application of ammonia water. A clay poultice is frequently serviceable in bee stings. The more poisonous insect bites had best be incised and allowed to bleed freely, as in this way some of the poison may be disposed of and the edema reduced.

Multiple punctures made by a coarse needle afford a means of escape for the serum imprisoned in the surrounding tissues. The pain is somewhat lessened by the application of cold. If that does not suffice the following wash may be applied:

℞ Lig. plumbi subacetat. 3i 4,0
Tinct. opii 3i 4,0
Aquae 3iv 120,0
M. Sig. Apply on lint.

Furuncles (*Boils.*)—Furuncles occur on the lips, but are more often found on the neck, trunk, and extremities.

A boil is the result of an infection of the skin with the Staphylococcus aureus by way of the hair follicles.

Treatment.—Treatment consists in shaving the part, and then, if the condition has not progressed to abscess formation, simply applying a coat of tincture of iodin or a fifty per cent ichthyol ointment. If an abscess has already formed incision and drainage are necessary. Recovery will be hastened by swabbing out the abscess cavity with pure carbolic acid

and then with alcohol. By so doing we destroy a large amount of infectious material and hasten the casting off of the slough which is a prerequisite of healing. Another means to the same end is the daily cleansing of the abscess cavity with peroxid of hydrogen. Moist and septic dressings should be applied if possible and changed frequently. Solutions of strong poisons like bichlorid of mercury should not be used for this purpose as they might easily find their way into the mouth.

The two following solutions will be found satisfactory. The first is called Thiersch's solution and the second, Burrow's:

℞	Ac. boric.	ʒiii	12,0
	Ac. salicylic	ʒss	2,0
	Aquae	℥xxxii	1000,0
M.			

℞	Pulv. aluminis	ʒi	4,0
	Plumbi acetat.	ʒvi	24,0
	Aquae	℥xvi	500,0
M.			

When a dry dressing must be applied iodoform gauze in the cavity with a sterile outer covering will do. If the lesion is small, powders are applicable, such as iodoform, dermatol, aristol, or calomel, suitably protected by an outer dressing.

A very satisfactory treatment for hard boils not ready for the knife is the Klotz plaster, made according to the following formula:

Emplastic diachyli	℥ii	60,0
Emplastic saponis	℥i	30,0
Cerae japonicae	ʒss	2,0
Petrolati	ʒii	8,0
Acidi salicylici	ʒi	4,0

M. ft. emplastrum lege artis.

Regarding the employment of this plaster Pollitzer, of New York, writes as follows:

It is useless to hand this prescription to your patient and tell him to apply the stuff. It will take the druggist a day to make it, and at his first attempt he will probably make it badly. I advise you to give the formula to a druggist in your neighborhood and direct him to put up a quantity of the plaster and keep it in stock, rolled in sticks of about a half ounce each, wrapped in paraffined paper in which it will keep indefinitely. The patient is instructed to spread the plaster by means of a stiff knife on a sheet of common muslin (sheeting), "like butter on bread," and apply a sufficiently large piece of the spread plaster, say one to two inches square, centrally over the boil. The effect of this plaster is

almost immediate. The plaster acts as a cutaneous splint to protect the tender area, it softens the epidermis and thereby relieves tension quite as effectively as an incision; it softens and removes the little crust at the summit of the boil and thereby facilitates the discharge of the pus, and finally it serves as an occlusion dressing and by preventing the accidental spread of infectious matter over the skin reduces the probability of fresh infections.

The plaster should be changed—applied fresh—at first once a day, later when the boil is discharging freely, twice a day, and perhaps three times on the day of the discharge of the core. To cleanse the skin from the adhering traces of the plaster, to remove it from the fingers and the knife and scissors used, a pledget of cotton wet with benzine should be used. At each change of dressing the boil should be gently squeezed—with emphasis on the "gently"—to remove the droplet of pus that is ready to come out, and the pus itself wiped up—not smeared about—with a bit of cotton moistened with a bichlorid solution and squeezed dry. It may be well too at each change of dressing to soak a considerable area of the skin around the boil for five minutes with a layer of cotton thoroughly wet with a bichlorid solution to kill any superficially located germs.

Paste for furuncles or boils:

℞	Kaolin	℥ii	60,0
	Glycerin	℥i	30,0
	Ichthyol	℥iiss	10,0

M. S. Apply on lint.

Vaccine therapy has come into vogue of late and seems to be of service in preventing recurrence or extension. A hypodermic injection of 400 millions of dead Staphylococci (stock vaccine) is given once or a series of injections may be necessary at intervals of five days.

Furunculosis Prophylaxis.—Persons who have reason to fear the occurrence of furunculosis, as for instance diabetics, may use ichthyol or synol soap as a prophylactic. Boils can sometimes be aborted by painting them twice in twenty-four hours with tincture of iodin.

Spongy Gums.—Spongy gums are due to general causes, such as poisoning by mercury, lead, or phosphorus; or they develop in gout, rheumatism, diabetes, in syphilis, malaria, and scurvy, and lastly in general asthenic states accompanying protracted fevers. On the other hand, local conditions may be operative, such as the use of too hot solutions in rinsing the mouth; carious teeth; deposits of tartar, and the violent use of tooth brushes, dental floss, and tooth picks.

Treatment.—Any general ailment must receive appropriate treatment, the dental conditions present should be remedied and a mildly astringent and antiseptic mouth wash should be used—for example, chlorate of potassium (℥i to ℥xvi), or listerin, alkalol, boroformalin diluted, etc.

Retracted Gums.—Retracted gums are frequently the accompaniment of advancing age or of pyorrhea alveolaris.

Treatment.—The local treatment consists of removing any tartar present and then applying the compound tincture of benzoin. The application can be repeated several times a day.

Tartar.—Tartar is composed of calcium carbonate and phosphate mixed up with the débris found in the oral cavity. It had best be removed mechanically, but when, on account of the tenderness of the teeth, their looseness, or the inflammation of the gums, this cannot be done, the following procedure may be carried out.

Prophylaxis and Treatment.—Separate the gums from the teeth by means of a scaler and irrigate the pockets formed between them with peroxid of hydrogen. On the point of a probe or a very fine swab introduce a minute quantity of aromatic sulphuric acid, especial care being taken not to touch the crowns of the teeth.

In a few minutes neutralize the acid by rubbing into the gums and all open spaces between the teeth a powder composed of sodium bicarbonate and borax (equal parts). The final step is to shrink up the gums against the teeth by applying a saturated solution of tannic acid in Eau de Cologne.

Prophylaxis consists of the proper care of the mouth. Brushing the teeth at least twice a day for three minutes by the watch and the use of antiseptic mouth washes will do much to prevent the deposit of tartar. Especial care should be taken to clean the tongue if it is heavily coated. Such preparations as Dobell's solution, Liq. antisepticus (U.S.P.) and the Liq. antisepticus alkalinus, will answer as good mouth washes. The following, though of simpler composition, are equally good:

℞	Ac. salicylic	ʒss	2,0
	Sod. biborat.	ʒss	2,0
	Tr. myrrhae	ʒiiss	10,0
	Aq.	ad ℥iv	120,0
M.			

℞	Sod. chlorid.	ʒss	2,0
	Sod. boratis	ʒss	2,0
	Glycerin	℥iss	45,0
	Aq. gaultheriae	ad ℥viii	240,0
M.			

℞	Ac. boric	ʒss	2,0
	Potass. chlorat.	ʒi	4,0
	Aq. menth. pip.	℥vi	180,0
M.			

Pyorrhea alveolaris.—Pyorrhea alveolaris is a chronic suppurative condition of the gums incited by the action of tartar and microbic infection

and maintained because of some general condition like gout, rheumatism, scurvy or intestinal intoxication which produces a state of lowered local resistance.

Treatment.—The treatment consists of removal of the tartar, correction of any faulty dental condition, oral antisepsis, and general up-building of the entire system by physical exercise.

The following is a splendid mouth wash for this condition:

℞	Formalin	gr. vi	0,4
	Sodii boratis	ʒss	2,0
	Eucalyptol	gr. xxii	1,5
	Menthol	gr. vi	0,4
	Alcohol	ʒiv	15,0
	Aquae	adʒviii	240,0

M. S. One teaspoonful to a glass of water used as mouth wash.

Emetin hydrochlorate in half grain (0,03) doses every other day is lauded as a specific in pyorrhea.

Benign Epulis.—Benign epulis is either a fibroma of periosteal derivation or a granuloma arising from the pulp of a decayed tooth. It gives rise to no symptoms except those due to pressure on adjacent structures. It should be completely removed, however, as a precaution against the possibility of malignant degeneration.

Toothache.—Toothache has various causes, located either in the tooth itself, its socket, or in the nerve supplying it. Erosion of the enamel permits of an intermittent odontalgia by allowing mechanical, thermal, or chemical irritation to take place.

Prophylaxis and Treatment.—Caries of the dentinal substance may or may not be painful, according to whether the dentinal fibers retain vitality or not. If there is pain with dentinal caries it may be lessened by the application of a one to two thousand solution of potassium permanganate. When the pulp cavity becomes opened to the air it frequently causes excruciating pain, and if a purulent pulpitis develops the deep boring pain of alveolar abscess will be superadded to it. A simple exposure of the pulp cavity without infection may be temporarily remedied by closing the opening with a piece of beeswax, paraffin, or chewing gum. If obtainable one of the following preparations is better for this purpose however:

℞	Ac. tannic.	gr. xx	1,3
	Mastich.	gr. x	0,6
	Ether sulf.	ʒiv	16,0

M.

℞ Acid. arsenicos ..... gr. xv 1,0
Cocain. mur. ..... gr. xv 1,0
Menthol. cryst. ..... gr. iii 0,2
Glycerin ..... ʒiii 12,0
M.

℞ Collodii flex. ..... ʒii 8,0
Acid carbol. crystal ..... ʒii 8,0
M.

The first of these formulae will not kill the pulp while the second and third will. The pulp should be destroyed if there is a purulent pulpitis. Alveolar abscess can be relieved by opening it either through the gum, between the gum and tooth, or by extracting the tooth.

In simple periostitis or cementitis without pus formation the teeth and gums are tender to the touch, and relief may be given by painting the gums twice daily with the following solution:

℞ Tr. iodi ..... ʒiv 16,0
Tr. aconiti ..... ʒi 4,0
M.

Always remember that relief from pain does not mean a cure of the condition and that a dentist should be consulted in regard to the permanent work necessary. *Trifacial neuralgia* involving the dental branches may have its origin in a bad tooth.

Preventive treatment as far as it pertains to local conditions consists in properly cleansing the mouth and teeth. The toothbrush and dental floss are to be used at least twice a day and regular visits to the dentist should be made.

Care must also be taken when medicines containing acids or iron are given that the teeth are not damaged. This may be done by using a medicine tube and by washing out the mouth afterwards. The taking of large quantities of "sweets" furnishes a good nidus for the fermenting bacteria, and as a result of their growth lactic and acetic acids are produced in large amounts to the detriment of the teeth. It may be well to give formulae for a good dentifrice and a mouth wash, as most of those marketed at present are of unknown composition.

℞ Saponis hisp. ..... ʒii 8,0
Pulv. iridis ..... ʒii 8,0
Cretae precip. ..... ℥ii 60,0
Magnes. carb. ..... ℥ii 60,0
Ol. eucalypti ..... gtt. viii 0,5
Ol. rosae ..... gtt. viii 0,5
M. S. Tooth powder.

℞ Potass. chlorat. ..... ʒi 4,0
Tr. myrrhae ..... ʒiss 6,0
Elix. calisayae ..... ʒiii 90,0
S. Mouth wash. Dilute 1 to 3.

Recently it has been suggested that an acid dentifrice is superior to an alkaline one; thus vinegar diluted with three parts of water may be employed.

℞ Magnesium peroxid, 200 mesh sieve .....60 parts
Soda perborate .....30 "
Castile soap powder .....10 "
Oil menth. pip ..... 1 part
S. Tooth powder. Mix, keep in widemouth glass-stoppered bottle in dry place.

℞ French chalk .....30 parts
Soap .....15 "
Sugar .....15 "
Gum acacia ..... 2 "
Berlin red ..... 2 "
Oil of peppermint ..... 2 "
Glycerin ..... 8 "
Water ..... 8 "
The whole to be worked into a paste.
S. Tooth paste.

General treatment comprises everything that tends to upbuild the entire system.

Burns of the Tongue.—Burns of the tongue are about the only form of general acute glossitis we need consider here. The burns may be thermal or chemical in origin. The latter are usually the more severe.

Treatment.—Pain due to burns may be relieved according to the intensity of the reaction by sucking ice, by a two per cent solution of carbolic acid in glycerin, or by a two per cent solution of cocain applied with a brush or swab.

The further treatment consists in the use of antiseptics in the mouth, preferably in the form of a spray, as this causes less mechanical irritation.

To prevent the discomfort caused by the pressure of the swollen tongue against the palate two wedges of paraffin may be set laterally between the jaws and the teeth sunk into them. In this way the lower jaw is fixed with the mouth partially open and the mandible can be still further controlled by a folded handkerchief passing beneath it and tied on the top of the head. By fixing the jaws we prevent the patient from con-

tinually irritating the tongue—which he will almost surely do if left to himself.

Occasionally it is necessary to scarify the tongue to reduce the secondary swelling which at times is excessive. To do this make superficial paracentral incisions from behind forward. In very exceptional cases swelling may occlude the air passages, making tracheotomy necessary.

About the best food in such cases is ice cold milk, which acts as an emollient to the inflamed surface.

Simple Acute Ulceration of the Tongue.—Simple acute ulceration of the tongue is usually the result of some slight wound caused by a rough tooth, a fishbone, etc. It is more likely to occur in a poorly cared for mouth or in a subject who suffers from hyperchlorhydria.

Treatment.—The treatment is local application of silver nitrate solution (gr. xx to ℥i) and general oral antisepsis.

Tuberculous Ulcers of the Tongue.—These are characterized by pain. They are irregular, indurated, undermined, and frequently surrounded by a zone of minute tubercles. The site of election is the anterior part of the dorsum near the margin. Primary lesions are rare. The condition usually develops as a sequel to laryngeal or pulmonary tuberculosis.

Treatment.—The treatment is curettage, cauterization, and local anesthetics, if the pain becomes too intense.

General supportive treatment is indicated, as for tuberculosis occurring elsewhere in the body. (*See* Section V.)

Syphilitic Ulceration of the Tongue.—Syphilitic ulceration of the tongue may take two forms. First, there may be a primary chancre of the tongue. This usually gives one the impression of a rather sluggish process infiltrating quite a large area and necrosing toward the center. The usual specific ulcer of the tongue arises from the breaking down of a gumma. Its most frequent location is near the back of the tongue close on one side or other of the median line. It is usually not very painful. The edges are clean cut, not indurated, and circular in contour.

Treatment.—The treatment is the regular antisyphilitic measures, and locally the application of tinctures of iodin or calomel. (*See also* Section V.)

Tobacco Tongue.—Tobacco tongue occurs in two forms. The first presents areas more or less circular in outline which are darker than the normal circular surrounding and appear smooth and ironed out, as it were. There may be so much tenderness that spiced and sour fluids cause much irritation. In the second type, which is found especially in tobacco chewers, the circumvallate papillae at the back of the tongue are reddened and inflamed and the glosso-epiglottic ligaments may be swollen. There is a general sensation of something lodged in the back of the throat and repeated swallowing movements occur almost automatically. Besides this there is a general feeling of lameness about the root of the tongue.

Prophylaxis and Treatment.—Treatment consists in stopping the tobacco and using mouth washes and gargles.

Coated Tongue.—Coated tongue is a term applied to a condition of that organ in which a layer of desquamated epithelium, mucus, bacteria, and débris are deposited on the dorsum. The color may be anywhere from black to grayish-white and usually depends upon some accidental ingredient.

The causes, the removal of which may cure the condition, are as follows: carious teeth, nasal and pharyngeal catarrh, hypo-acidity of the stomach, carelessness in regard to cleansing the mouth, dyspepsia, etc.

Prophylaxis and Treatment.—The common custom of scraping the tongue should be discouraged, as it frequently causes undue irritation. A mixture of soap water and glycerin will cleanse the tongue without injuring it. The coated tongue of indigestion usually requires five drops of diluted hydrochloric acid in water after eating.

Leukoplakia.—This is a chronic affection, frequently luetic in origin, in which there are localized submucous areas of sclerosis covered with a thinned-out mucosa which have a grayish appearance and are at times moderately sensitive.

Treatment.—Treatment of leukoplakia consists in painting the spots with a mixture of glycerin and alcohol (equal parts) or a one to two per cent chromic acid solution. Mildly astringent gargles often reduce the irritation about these lesions. Single spots may be removed or destroyed by excision or the galvanocautery.

Constitutional antiluetic treatment may be necessary.

Geographic Tongue.—Geographic tongue is a term applied more often to certain general maplike appearances of the tongue than to any particular disease entity.

One type is caused by circinate areas of desquamation healing toward the center and spreading at the periphery, which eventually merge into one another. It resembles eczema and sometimes causes heat and itching. Some relief can be given by painting with a two per cent solution of silver nitrate.

Another type is caused by an atrophy in the deeper layers of the mucous membrane causing a wrinkling like that which occurs from senile changes in the skin. This type is without symptoms except when excoriations occur which are favored by the decomposition of food débris retained within the crevices of the mucous membrane. Simple oral antisepsis is the only treatment necessary.

Tongue Tie.—Tongue tie is an abnormally short frenulum which prevents the extension of the tip of the tongue. It may hamper nursing and, later, speech.

Treatment.—The treatment is to incise the frenulum at the level of the floor of the mouth for a short distance, avoiding injury of the arteries.

Wounds of the Tongue.—Wounds of the tongue, when not extensive or involving a large artery, heal promptly with simple oral antisepsis.

Treatment.—Large cuts should be sewn with silk suture. If a large vessel has been opened reach it and ligate even if it is necessary to extend the wound to do so. Occasionally it may be necessary to ligate the lingual artery.

Exfoliation of the Mucous Membrane Covering the Hard Palate.—This condition occurs in the anemic state associated with hyperacidity of the stomach. Normally the mucous membrane is very firmly attached in this situation and quite tough, but under these conditions it becomes moderately infiltrated with serum and markedly friable, so that slight mechanical irritation, such as that produced while chewing solid food, is enough to strip it off.

Treatment in Exfoliation.—One of the mouth washes previously recommended should be used and the raw palate may be painted over with compound tincture of benzoin several times a day. The systemic condition underlying the process will need appropriate treatment. The elixir of iron, quinin, and strychnia (one teaspoonful three times a day) may be given.

An antacid is also occasionally indicated, such as milk of magnesia or the following formula:

℞ Magnes. ust. .....
Bismuth. subnit. ..... āā ℥iv 15,0
Cretae preparatae .....
Sod. bicarb. .....

M. et divide in chart No. xx. S. One powder one hour after meals.

Generalized Stomatitis.—Generalized stomatitis is produced by agencies which act more or less on the entire oral mucous membranes. The factors at work may be irritants, poisons or infectious material taken into the mouth or else invading the mucous membrane by means of the blood or lymph streams. The types of inflammation may be diffuse catarrhal, follicular, ulcerative (aphthous), and gangrenous.

Prophylaxis and Treatment.—Treatment consists in removing or combating the cause and, secondly, stimulating the mucous membrane to repair. The *local treatment* consists in antiseptic mouth washes and touching up any ulcerations present with five per cent silver nitrate solution or chromic acid—one to two per cent, or a rose-colored solution of potassium permanganate. Mouth hygiene will prevent stomatitis.

Thrush.—Thrush is a form of generalized stomatitis needing especial mention. It is produced by the growth of a spore-bearing fungus, the exact position of which in the scale of microscopic flora is disputed.

For a long time it was supposed to be identical with the oidium albicans, but now it is more often described as the Saccharomyces albicans. At any rate it develops chiefly in the mouth of infants brought up under poor hygienic conditions. It invades the mucous membrane and grows along the surface.

Prophylaxis and Treatment.—Treatment consists in cleansing the mouth after each feeding with a solution of bicarbonate of soda or borax and, if this does not suffice, with one-fourth of one per cent formalin solution.

Prophylaxis consists in cleanliness, both of the mouth of the child and everything coming in contact with it, including nursing bottles, nipples, spoons, etc.

Inflammation of the Salivary Glands.—This condition occurs by extension of an infection from the mouth and also as a part of general systemic infections.

Prophylaxis and Treatment.—In all non-suppurative forms external applications of tincture of iodin or fifty per cent ichthyol ointment and the use of antiseptic mouth washes are indicated. In the suppurative forms incision and drainage become necessary. Mouth hygiene will prevent this condition.

Mumps.—Mumps is a highly contagious affection of the salivary glands, usually starting in one parotid and then extending to the other. It occasions varying grades of systemic intoxication and occasionally secondary inflammation of the testes, ovaries, breasts, etc. The period of incubation is from one to three weeks and the duration about the same. Due to the pain and swelling it is hard to cleanse the mouth properly and thus various secondary infections, more or less severe, get a foothold.

Prophylaxis and Treatment.—Treatment consists of rest in bed, light diet, oral antisepsis, and local application of heat.

The dry mouth in mumps is due to lack of saliva, for which frequent rinsing of the mouth with cool water is indicated. It is claimed that the intramuscular injection of blood from the vein of a mumps convalescent is a prophylactic in mumps.

Ranula.—Ranula is a term applied to variously situated salivary cysts caused by occlusion of either Wharton's or one of the sublingual ducts.

Treatment.—The treatment is incision and destruction of the lining mucous membrane with some superficially-acting caustic like silver nitrate, or carbolic acid followed with alcohol.

Dry Mouth.—Dry mouth is usually a temporary condition but it may become permanent. It is occasioned by catarrhal conditions in the mouth, fever, drug action and is a constant symptom in mumps and febrile or chronic diseases and highly emotional states. The result is to render swallowing and speaking difficult unless fluids are continually taken.

Treatment in Dry Mouth.—Various tablets and lozenges are on the market to relieve this condition. Sucking lemon drops or licorice drops and chewing slippery elm bark will afford relief. When the tongue is dry it should be swabbed with equal parts of rose water and glycerin.

Salivation.—Salivation is caused by various drugs and accompanies stomatitis, especially that connected with teething, and reflexly by gastritis, pregnancy, trigeminal neuralgia, hysteria or central nervous disease and vagotonia.

Treatment in Salivation.—The local treatment consists of astringent mouth washes, such as the following:

℞	Potass. chlorat.	ʒiii	12,0
	Tr. myrrh.	ʒiv	15,0
	Aq. camphor.	℥viii	240,0
M.			

℞	Acid tannic	ʒi	4,0
	Mellis rosae	℥ii	60,0
	Aquae	℥vi	180,0
M.			

Atropin sulphate may be given in small doses in very obstinate cases but care must be exercised with this drug. (*See* Vagotonia, Section XII.)

Fetor of the Breath and Bad Tastes in the Mouth.—These conditions are so closely associated that they had best be considered together.

Carious teeth, stomatitis, nasopharyngeal catarrh from adenoids and tonsils, bronchiectasis, chronic gastritis associated with stasis of the gastric contents, are some of the more common predisposing causes. Occasionally the condition is purely subjective and rests in the mentality of the patient. Local putrefaction is usually the direct cause, although in certain conditions like diabetes, anemia, jaundice, etc., the expired breath becomes tainted by abnormal gases produced in the system. Certain foodstuffs also cause their peculiar odor to be associated with the breath of the individual for considerable lengths of time.

Treatment in Fetid Breath.—The removal of local conditions, the employment of antiseptic mouth washes, and the administration of dilute hydrochloric acid in five-drop doses three times a day, and attention to the bowels is the rational treatment.

An odor can sometimes be displaced by a stronger one and there are many confections on the market for the purpose. A coffee bean chewed for a few moments will often answer.

Gastro-intestinal Ailments

(See also Section VII)

Upset Stomach.—Upset stomach is an acute, usually transitory condition dependent upon various factors. An upset stomach may be due to excessive quantity or peculiar quality of the substances ingested, or to shock and various nervous reflexes, or to the abnormal excretion by the gastric mucous membrane of toxic substances carried in the blood.

The taking of moderately excessive quantities of food or liquids produces a sensation of fullness or distress which soon passes off. A short walk after dinner aids in "settling" the meal by promoting peristalsis, and therefore aiding the passage of food from the overcharged stomach into the intestines.

The question will arise: What is meant by excessive quantities of food? The answer may be given as follows: When food is taken in quantities beyond the physiological requirements of the body, and especially when it is present in the alimentary tract in such volume or concentration that the normal digestive and assimilative processes cannot cope with it, then it is excessive.

This clinical standard works out in practice better than any dietary based on caloric values or proportional arrangement of protein, carbohydrate, and fat, because these latter are all based on averages which are often inaccurate when applied to the individual. They do give us a point to start from, however, and are thus useful as guides until the personal equation has been determined.

When the quantity of food taken has been very extreme the stomach resents overdistention by a sharp reverse peristalsis which produces vomiting. Such a condition is brought about by tight lacing which so reduces the abdominal space that even small quantities of food may produce a high degree of pressure.

Nature usually masters these conditions, but sometimes the pressure of the distended stomach on adjacent organs so embarrasses their action that alarming symptoms develop which only a prompt gastric lavage can relieve. The quality of food or drink may be such that an acute inflammation of the gastric mucosa is set up. The causative factor may be extremes of temperature, concentration, high seasoning, alcoholic content or unaccustomed food. This latter is very important; for instance, the substitution of olive oil for butter in preparing food may entirely derange a sensitive stomach. Thus in traveling we may upset the stomach although the food partaken of has been perfectly good and wholesome all the while.

The trouble here is that the stomach could not immediately adjust itself to the handling of strange food.

Treatment.—The treatment here is simply to eliminate the disturbing elements from the dietary and aid digestion by taking 10 drops of dilute hydrochloric acid in water after eating.

Upset Stomach Due to Temporary Inhibition of Gastric Function.—This derangement is due to various reflex causes. There may be lesions or disturbances existing elsewhere in the body or some psychical disturbance. We all have seen how a sharp pain can absolutely disturb a good appetite. The same thing happens from fear, grief, shame, excitement, joy, or great concentration of mind.

In most of these cases examination will reveal a complete cessation of gastric secretion and if food is taken it usually remains undigested in the stomach for hours, perhaps, until finally it is vomited or disposed of by a restored digestion.

Treatment.—If in a given case overeating causes symptoms sufficiently violent to require the presence of the physician the first thing for him to do is to get the patient in a cool, quiet room, in a reclining posture and with the clothes loosened. He should then determine the pulse tension and cardiac action and decide whether the case is immediately critical or not. Usually it is not, and one can often elicit from some member of the party whether the patient has any particular idiosyncrasy or has *any chronic ailment* which might have been aggravated by any item of the menu; also whether any of the following factors bear on the case: epilepsy, hysteria, alcoholism, poisoning, menstruation, some acute pelvic disease, pregnancy, appendicitis, peritonitis, arteriosclerosis with threatened apoplexy or acute cardiac insufficiency.

If after this investigation the symptoms prove to be due to an overloaded stomach the next thing to do is to relieve the pain, if excessive, by a hypodermic injection of 0,02 gm. of morphin sulphate. Stomach lavage may follow the morphin, as the passage of the tube causes very little retching. If no tube is at hand, however, vomiting may be induced by tickling the back of the pharynx, giving large drinks of warm mustard water or salt water or by the hypodermic injection of 0,005 gm. of apomorphin.

After the stomach is empty allow the patient to rest a few hours and then clear the bowels with salts, calomel, or enemas. The diet should at first be light and sparing, then gradually increased as the condition rights itself.

All appetite may disappear for a time after one of these attacks, which seems to depend upon the profound mental impression produced. Sometimes the aversion is exhibited only toward the article of food supposed to have been responsible. The following prescription may be found of service in reëstablishing normal conditions:

℞ Acid muriatic dilut. .....
Tinct. cinchonae co. ..... āā ʒiv 15,0
Tinct. gentian co. .....

Sig. One-half teaspoonful in a wineglassful of water after eating.

Fatigue Dyspepsia.—One of the very common forms of dyspepsia is found in the man who will not let his brain stop working long enough to give his stomach a chance to digest his food. Such a man scans the headings of his newspaper over a cup of coffee and a roll in the morning, grabs a quick lunch in the middle of the day, and ends it by overeating at night —to which his wife possibly unconsciously lends herself by having everything on the table for him to stuff himself with when he comes home. In reviewing this system of living we find the inadequate breakfast partaken of when the brain is already making demands for an increased supply of blood. The midday meal is usually a very concentrated one.

Take, for example, the popular drink served at all drug and lunch counters known as "the quick lunch." It consists of a rich milk into which is put an egg, malted milk powder, sugar, and chocolate syrup. This tabloid dinner, for it is not a lunch at all, is served ice cold, thereby throwing added work on the stomach with but very little time before the blood stream will again be diverted to the head. Now if to some such concoction as this is added an assortment of sandwiches, cakes, pies, candy, fruit, or a glass of beer or something stronger, it is not to be wondered at if the stomach balks.

At night, in a tired, worn-out condition, the big meal of the day is disposed of, usually in a hurry, so that some social engagement may be met. The custom of dressing for dinner gives the advantage to the better classes of more or less rest, and probably benefits them by the relaxing influence of a warm bath before called upon to digest a hearty meal. This is a condition to be understood and warned against. All that can be said prophylactically is *do not do it.*

There is a type of upset stomach among cooks and housewives which has its inception in the loss of appetite, due to the fact that they have so much to do with the preparation of food, often under very fatiguing conditions. There follows a psychic revulsion against eating. These people become "pickers" and "nibblers," eating small quantities irregularly and usually choosing highly seasoned articles.

Medication is useless in such cases and a cure can only be expected if the patient can be taken from the kitchen and given a new field of labor. Occasionally I have had some success by instructing this class of people not to eat their own cooking and to have at least one hour's exercise in the open air before partaking of the main meal of the day.

Loss of Appetite.—Loss of appetite is due to many causes, chief among

which are deficient gastric secretion, fear of pain or discomfort, mental pre-occupation, a flat or poorly varied diet, auto-intoxication, constipation, acute infectious diseases, irregular habits, advancing age, alcoholism, lack of exercise, housing up, and the depressive psychoses.

Prophylaxis and Treatment.—To overcome this we must correct any hygienic, personal, or dietary errors present and treat associated pathological conditions existing appropriately; also one must see that the meals while simple are prepared in a savory and tempting manner and served at regular hours. For elderly people a little wine acts as a good appetizer.

For upset stomach, simple loss of appetite and simple forms of dyspepsia the following prescriptions will be found serviceable. Constipation if present must also be overcome in this class of cases.

℞ Acid nitro-muriat. dilut. . . . . ℥iv 15,0
Tr. gentian co. . . . . ℥ii 8,0
M. S. Ten drops in water before meals.

When gastric secretion is sluggish but can be called forth, one of the following preparations may be useful:

℞ Strychnin sulphat. . . . . gr. i 0,05
Acid nitrohydrochlor. dil. . . . . ℥i 4,0
Tr. gentian. co. . . . . ℥i 30,0
Tr. cardamom. co. . . . . ℥i 30,0
Ess. pepsini . . . . . ad ℥iv ad 120,0
M. S. One teaspoonful after each meal.

℞ Sod. bicarb. . . . . ℥i 4,0
Tr. nucis vomic. . . . . ℥i 4,0
Tr. gentian. co. . . . . ad ℥iii 90,0
M. S. One teaspoonful before eating. Double dose if necessary.

℞ Ac. hydrochlor. dil. . . . . ℥iv 15,0
Tr. cinchonae co. . . . . ℥vi 180,0
M. S. One-half to one teaspoonful in water, two hours after eating.

If pain or the fear of pain on eating has destroyed the appetite the condition may be relieved by hot stupes to the abdomen and the use of prescriptions like the following to limit pyrosis:

℞ Argent. nitrat . . . . . gr. v 0,3
Extract. hyoscyami . . . . . gr. x 0,6
M. ft. pil. No. xx. S. One pill one hour after eating.

℞ Magnesiae ustae
Pulv. rhei
Sod. bicarbonat
Sacchari lactis
āā ʒv 20,0

M. S. One-half to one teaspoonful in water, two hours after eating.

If the gastralgia is very severe, the following medication may be necessary:

℞ Ac. hydrocyan. dil. ʒi 4,0
Fl. ext. cannab. indic. ʒi 4,0
Tr. hyoscyami ʒiss 6,0
Sp. chloroformi ʒii 8,0

M. S. Thirty drops in water after eating.

℞ Chloral hydrat. ʒi 4,0
Sod. bromid. ʒiiss 10,0
Aq. chloroform. ʒiv 120,0
Sp. anisi gtt. iv 0,25

M. S. One teaspoonful before meals.

℞ Ac. hydrocyan. dil. gtt. xxx 2,0
Morphin sulph. gr. i 0,06
Syr. tolutani
Aquae
āā ʒi 30,0

M. S. One teaspoonful before eating.

Loss of appetite from gastro-intestinal auto-intoxication will be benefited by saline catharsis, and by changing the intestinal flora with the Bulgarian bacillus.

In loss of appetite in alcoholic cases the following will be found of considerable service:

℞ Tr. capsici ʒi 4,0
Tr. nucis vomicae ʒi 4,0
Tr. zingiberis ʒiiss 10,0
Tr. cinchonae co. q. s. ad ʒiv ad 120,0

M. S. One teaspoonful in water after eating.

In the nervous depressive types all stimulating and upbuilding tonic measures are indicated. Such mixtures as the following are in order:

℞ Tr. nucis vomicae..... ʒi 4,0
Tr. columbae..... ʒi 4,0
Tr. capsici..... ʒi 4,0
Tr. valerianae..... ʒii 8,0
Ex. quassiae fl..... ʒii 8,0
Tr. lavandulae co.....ad ʒiv ad 120,0
M. S. Two teaspoonfuls in sugar water, one-half hour before eating.

℞ Ex. cocae fl.....
Tr. cinchonae co..... āā ʒii āā 60,0
Tr. gentian. co.....
M. S. Two teaspoonfuls in sugar water, before each meal.

℞ Strychnin sulph..... gr. ½ 0,3
Ac. sulphur. dil..... gr. xxx 2,0
Quinin. sulph..... gr. xxx 2,0
Lig. sod. arsenat..... ʒi 4,0
Vini ferri citrat.....ad ʒiv ad 120,0
M. S. One teaspoonful in sugar water, after eating.

℞ Fl. ext. condurango..... ʒiss 45,0
Strychnin. sulph..... gr. ⅓ 0,02
Ac. hydrochlor. dil..... ʒiii 12,0
Eliz. gentian.....q. s. ad ʒvi ad 180,0
M. S. One teaspoonful diluted, after eating.

In those cases where the STOMACH HAS PERMANENTLY LOST ITS SECRETORY POWER preparations of pepsin and hydrochloric acid may be tried, or pancreatin, or one of the vegetable ferments lately put on the market.

Vomiting.—Vomiting may be caused by mental factors, reflex irritation, direct irritation of the medullary vomiting center, unsuitable food or drink, coughing, seasickness, abnormal excretory conditions, and hypersensitiveness of the stomach itself.

THE VOMITING OF PREGNANCY is of especial interest and may be due to simple reflex irritation or to toxins acting on the gastric mechanism. The reflex morning vomiting of early pregnancy can often be relieved by giving the patient a cup of coffee and a roll before she arises.

If medication is necessary the following may be prescribed:

℞ Creosot. ..... gtt. xxiv 1,5
Tr. gentian. co..... ʒiii 90,0
M. S. One teaspoonful three times a day before eating.

A few drops of the *liquor iodi compositus* in a wine glass of water may act when nothing else will.

The vomiting of auto-intoxication is a grave sign in pregnancy. It usually occurs later and may require the termination of gestation besides other appropriate measures not necessary to be discussed here.

Sedatives are necessary if the vomiting is of central origin and two classes of conditions exist. If the condition is more or less psychical the following will be useful:

℞	Tr. capsici	ʒi	4,0
	Tr. cannabis ind	ʒiv	16,0
	Tr. opii deodorat	ʒii	8,0
	Sp. chloroformi	ʒi	30,0
	Tr. lavandul. co.....ad	℥iv	ad 120,0

M. S. One teaspoonful in water before meals.

℞	Ammon. bromid	ʒiv	16,0
	Tr. cannabis indic	ʒv	20,0
	Syr. tolu.....q. s. ad	℥iv	ad 120,0

M. S. One teaspoonful in water after eating.

When the cause of the vomiting is a cerebral irritation the following types of medication are indicated:

℞	Chloral hydrat	ʒii	8,0
	Sod. bromid	ʒii	8,0
	Ol. anis	gtt. vi	0,4
	Aq. chloroform	℥iii	90,0

M. S. One teaspoonful in water one hour before meals.

℞	Potass. bromid	ʒvi	24,0
	Tr. hyoscyam	ʒvi	24,0
	Aq. menth. pip.....ad	℥iii	ad 90,0

M. S. One teaspoonful in water before meals.

When indigestible food is causing distress a pepsin hydrochloric acid mixture may be prescribed after ordering an enema:

℞	Ac. hydrochlor. dil	ʒii	8,0
	Pepsin. sacch	ʒii	8,0
	Glycerin	ʒii	8,0
	Aq. menth. pip.....q. s. ad	℥iii	ad 90,0

M. S. One teaspoonful in water three times a day after eating.

In HYPERACIDITY WITH VOMITING the following prescription will work out better practically, although it would appear unscientific to combine pepsin with an alkali:

℞ Bismuth. subnit.....
Magnes. ust..... āā ʒii āā 8,0
Pepsin. sacch.....
Aq. destil.....q. s. ad ʒiv ad 120,0
M. S. One teaspoonful one-half hour after eating (shake the vial).

VIOLENT COUGHING often brings on vomiting and preparations to control the cough may be indicated:

℞ Codein ..... gr. iv 0,25
Acid phosphor. dil..... ʒi 4,0
Acid hydrocyan. dil..... ʒi 4,0
Syr. tolutani..... ʒi 30,0
Aquae .....ad ʒiv ad 120,0
M. S. One teaspoonful occasionally to check cough.

When VOMITING IS DUE TO FERMENTATIVE CHANGES IN THE GASTRIC CONTENTS, gastric lavage may be indicated and one of the following prescriptions is serviceable:

℞ Acid. nitro-mur. dilut..... ʒiv 15,0
M. S. Ten drops after eating (diluted).

℞ Tinct. iodi..... gtt. xx 1,3
Aq. menth. pip..... ʒiss 45,0
Syrup ..... ʒiv 15,0
M. S. One teaspoonful every hour or two to check vomiting.

There are cases where the GASTRIC MUCOUS MEMBRANE SEEMS TO BE SO HYPERSENSITIVE that practically anything acts as an irritant and vomiting ensues. The condition must be controlled by analgesics, of which chloretone, in 0,3 (5 grain) doses in capsule, is very effective; also the following prescription:

℞ Morphin sulph.....gr. i 0,06
Sod. bicarb.....gr. viii 0,5
Bismuth subnitr.....ʒi 4,0
M. et div. in chart No. viii.
S. One powder three times a day, after eating.

Postanesthesial vomiting is the commonest type of upset stomach, due to that organ taking on abnormal excretory functions. We find other examples, however, in uremic conditions and in various diseases where there is a suppression of activity in one of the emunctory organs. The condition almost always rights itself but certain measures may be taken to reduce the severity of the attack.

The indications are best met by insuring an empty stomach before giving an anesthetic, using as little of the narcotic as possible and closing the anesthesia with an inhalation of oxygen. Chloretone in 0,3 (5 gr.) doses before anesthesia is said to reduce vomiting to a minimum. Morphin sulphate 0,02 (gr. ⅓) with atropin sulphate (gr. 1/200) given hypodermically one hour before commencing narcosis decidedly reduces the amount of anesthetic necessary. Washing the stomach at the close of the operation reduces the amount of after vomiting, but is usually impracticable.

Seasickness (*Mal de mer*).—Sickness caused by the motion of a boat, with its effect upon the brain and probably upon the semicircular canals of the inner ear and its accompanying gastro-intestinal toxemia, is a most distressing condition, and one most difficult to treat. Many remedies have been advocated, but most of them are ineffectual or only partly effective. For several days or a week before sailing, it is advisable to put oneself in as good physical condition as possible, regulating the diet and looking after the bowels. The diet should be *plain,* easily digestible, and not constipating. For three days before sailing from 30 to 60 gr. of sodium bromid a day, in divided doses, should be taken, and the use of the drug continued in slightly smaller doses during the voyage. It may be used in combination with strychnin, gr. 1/30 ter in die. Chloral, hyoscyamin, and atropin are also helpful.

During the voyage the diet should not be rich or constipating. One should be up on deck as much as possible, facing the wind. A cold bath daily and a daily cathartic if necessary are helpful. The prone position, with the head slightly lower than the body, gives some relief. Ice, lemon juice, or cold champagne or matzoon sometimes allay the nausea. *Mental suggestion* is very helpful. When *treatment* is unavailing the patient should rest in a horizontal position.

Although no deaths have been actually recorded as due entirely to seasickness, it has occasionally fatally aggravated hyperemesis gravidarum, and not infrequently its effects may be very bad and may last some days after a voyage is ended.

A stateroom amidships on the promenade deck, where the motion is least and no kitchen smell is noticed, is advocated. If one looks away upon the horizon, and does not watch the motion of the ship or water, one is less apt to be sick.

Mountain Sickness.—Upon reaching a great altitude, 10,000 feet or higher, one is likely to have a headache, nausea, dizziness, and gasping for

breath. The throat becomes very dry, the thirst is intense, the appetite is lost, and there may be severe malaise. The temperature may be slightly elevated. The symptoms may last for several days.

Eructations and Belching.—Eructations and belching are usually associated in the lay mind with fermentation, but as a matter of fact this is not the usual cause. Usually the gas present is swallowed air. In infants this may be introduced with the food because of improper nursing bottles and nipples and in adults through habit. This habit usually starts because of some pharyngeal affection which induces a sensation of something stuck in the throat, of which the patient instinctively tries to rid himself by swallowing. Another cause is the chewing habit which carries considerable quantities of air into the stomach along with the saliva.

Prophylaxis and Treatment.—When there is a real gaseous distention from fermentation, charcoal tablets, tablets of magnesia salicylate, exercise and enemata should be ordered. Beans, fat, pastry, and beer should be avoided.

Hiccough.—Hiccough is produced by a simultaneous spasm of the diaphragm and glottis, which provokes an inspiratory effort obstructed by a closed glottis. It is usually a transitory condition set up by psychical excitement but may be due to reflex irritation of the phrenic and pneumogastric nerves.

Treatment.—In hiccough holding the breath, gargling, tickling the nose to produce sneezing, gastric lavage, cold sprays on the epigastrium, faradism, or galvanism of the involved nerves, intermittent or rhythmical traction of the tongue, and such medication as the following may be of service:

℞	Sod. bromid.....	℥i	30,0
	Tr. opii camph.....	♏iv	15,0
	Tr. belladon.....	♏iii	12,0
	Aq. cinnamom.....ad	℥iii ad	90,0

M. S. One teaspoonful dil., to be repeated if necessary.

Chloral, cocain, or chloroform have been administered internally with success; also adrenalin (1 to 1,000) in 10 drop doses.

Postoperative hiccough may be due to the pressure of an abdominal tampon, and be completely relieved by its removal. This is especially true in gall-bladder and appendical cases. Hoffmann's anodyne in teaspoonful doses given in ice water is especially serviceable in these cases; also a half teaspoonful of aromatic spirits of ammonia given in the same way.

Gastric Pain.—Pain has been mentioned right along in connection with the various other symptoms of an upset stomach and now must receive especial attention. It is caused by direct irritation of the gastric mucosa, by cramp of the muscles of the stomach, or may be a referred pain. Malpositions and adhesions about the stomach are other causes of pain.

The pain produced by hyperacidity is controlled by antacids, of which several formulae have already been given, but one will be appended here for completeness:

℞	Magnesii carb.	3iv	15,0
	Sodii bicarb.	3iv	15,0
	Bismuth subcarb.	3ii	8,0
	Lycopod. pulv.	3ss	2,0

M. S. One teaspoonful in water after eating.

If the pain is due to hypersensitiveness the following may be useful:

℞	Phenacetin	3iss	6,0
	Ex. belladon.	gr. iv	0,25
	Codein	gr. v	0,3

M. et div. in cap. No. xx. S. One capsule after each meal.

In the pain of gastric crises associated with locomotor ataxia nothing but morphin will control the condition.

In gastralgia associated with muscular spasm the following formulae are especially valuable:

℞	Codein	gr. v	0,3
	Atropin. sulph.	gr. 1/10	0,0065
	Aconitin.	gr. 1/20	0,003
	Ex. cannabis indic.	gr. ii	0,12

M. et ft. pil. No. xx. S. One pill after eating.

℞	Tinct. castorei Tinct. opi	āā 3i	4,0
	Tinct. valerian. aeth. Aq. amygd. amar.	āā 3iiss	10,0

M. S. One teaspoonful in sugar water. May be repeated.

Benzyl benzoate in 2 to 10 drop doses, well diluted, may be tried.

Referred pain of course has its cause in some extragastric lesion and is not subject to local treatment of the stomach. Chronic appendicitis, chronic cholecystitis, and nephroptosis are frequently the exciting causes. Adhesions of the great omentum binding down the stomach, and adhesions between the stomach and adjacent viscera often embarrass the gastric mobility and cause pain. Sharp kinking of the gastric duodenal junction, caused by dilatation and sagging of the stomach, produces the same result. Supporting belts are of much value and in severe cases operative measures become necessary.

A peculiar type of PERIGASTRIC INFLAMMATION is found AMONG PEOPLE WHO USE TOOLS AGAINST WHICH THEY PRESS THEIR ABDOMEN TO STEADY THEM, such as the carpet stretcher. The symptoms often become marked after the cause is no longer active and so is not detected. Treatment consists in protection of the part and painting the upper abdomen with tincture of iodin as often as the skin will stand it, until relief is at hand.

Simple Diarrhea.—This is a condition characterized by abnormal fluidity and frequency of stools. The causes are manifold but reduce themselves to cases of irritation, hypermotility, hypersecretion, and hypo-absorption.

In the first class are included the cases produced by the ingestion of improper foods—such as unripe fruit, etc., those associated with acid stomachs, and those following cold drinks when taken in an overheated condition. Excessive putrefaction in the intestinal canal from bad cheese, spoiled meat or fish, etc., may accomplish the same result and can also be included here.

Treatment.—The treatment divides itself under two heads: elimination of the offending element and quieting of the disturbed bowel. The question arises as to which should be done first and will be answered differently under varying conditions.

When the causative factor is not highly toxic and its irritating properties are likely to be self-limited, it is best to avoid catharsis at first. My almost invariable rule in these cases is to give 0,6 (gr. x) pulvis Doveri or 10 drops of tincture of opium as an initial medication. In children a few drops of paregoric will suffice. The effect is usually to render the patient comfortable and then mild catharsis may be instituted. During this stage cereal decoctions and burnt flour gruel (*see* Section I) should be the diet. Milk is prohibited. Catharsis is best secured by emptying the lower bowel by means of an enema and then giving castor oil.

On the other hand if the causative agent is such that its effect may be expected to be accentuated the longer it remains in the bowel, a quick purging is best even though the discomfort is temporarily increased. The best drugs to use are magnesium sulphate, castor oil, and the compound licorice powder (U. S. P.). The salt is the quickest of these, the oil is secondarily constipating, and the powder keeps up its effect longest; so that with these three medicaments almost every indication can be met.

The second class, or those of *hypermotility,* usually have a neuropathic origin. If the subject is thin or more or less constant peristaltic movement of the bowels may be detected through the abdomen and on any special stimulus—such as a cold bath, exercise, or even eating, a cramp is produced which lasts from a few moments to one-half hour or more and ends with a sudden relaxation, allowing the passage of a watery stool and flatus accompanied by considerable gurgling throughout the abdomen. In

such condition, nve drops of tincture opii simplex, given two or three times during the waking hours, are to be employed with or without bismuth.

Another class of cases consists of those due to a *hyperexcretion* of the entire intestinal mucosa. If this is an effort on the part of nature to make up for a fault in one of the other excretory organs it should not be interfered with until a physiologic balance has been established. On the other hand, if instead of an active condition we have a passive one which we might almost term a leaking into the intestines, then we are justified in attempting to overcome the diarrhea.

In faulty circulation anything which impedes the venous and lymphatic flow in the intestines may be expected to generate a diarrhea unless offset by other factors. It is not surprising therefore to encounter diarrheas in early myocardial insufficiency, beginning hepatic cirrhosis, and commencing nephritis. Enteroptosis produces all the conditions necessary for the production of a diarrhea except that mechanically it renders defecation so difficult that bowel movements are infrequent; nevertheless examination of the abdomen reveals that the intestines are over full, as evidenced by the splashing sound and distended caput coli. Such cases will sometimes respond to the support given by an abdominal belt, and a liquid bowel movement will result. Gaseous distention of the bowel also tends to produce venous engorgement and so many of the easily fermenting foods aggravate the condition. Changes in the blood also favor diarrhea and we find the condition associated with the primary and some secondary anemias.

A class of cases not well understood but recognized at present may as well be included here—namely, those due to a *disturbed balance of the internal secretions.* Our treatment of these cases of hypersecretion then covers a wide field in general medicine and locally should be amplified by a binding diet and astringent medication, such as the following:

℞ Tanningen 3i 4,0
Bismuth. subgallat..... 3ii 8,0
Extr. opii..... gr. iii 0,2
M. et ft. in chart No. xii. S. One powder every three hours.

℞ Argent nitrat..... gr. ii 0,15
Ex. hyoscyami..... gr. v 0,3
M. et ft. pil. No. x. S. One pill three times a day, one-half hour before eating.

The last class of cases consists of those in which the normal bowel absorption is interfered with, the osmotic tension being relatively so high in

the intestine as to prevent the normal absorption, especially of liquids. If the food passes undigested we may be able to stimulate gastric and pancreatic secretion or supply predigested food.

The following prescriptions are serviceable:

℞ Papoid ..... gr. xx 1,3
Bismuth subnit..... 3i 4,0
M. et ft. chart No. x. S. One at meal time.

℞ Ex. hydrastis fl..... 3iv 16,0
Ex. condurango fl..... 3iv 16,0
Tinct. nuc. vomic..... 3ii 8,0
M. S. Thirty drops in a tablespoonful of tokay wine before eating.

In those cases where *inflammatory changes* are at the root of the trouble the intestine must be given as much rest as possible and the use of predigested or readily absorbable foods which have little or no residue is indicated (*see* Binding Diet List, Section I). The next thing to think about is to rid the bowel of any retained irritating substances, and here calomel followed by salts seems to act best.

Lately we have learned to influence the intestinal flora by opposing the lactic acid group to the putrefactive agents. This can be done by giving buttermilk, or the Bulgarian bacillus. The inflamed mucous membrane may be soothed by administering such preparations as liquid albolene, which acts as an oily coating without any danger of becoming rancid. In some cases it may be well to incorporate a little opium and bismuth with this, the amount varying with the indications. I have very little faith in the commonly employed intestinal antiseptics and rarely prescribe them. A bland, salt poor diet will not create an inordinate thirst which, if gratified, only adds to the fluid contents of the bowel. On the other hand the blood under certain conditions seems to become so saturated with effete material that its ability to absorb nutriments from the bowel is impaired. This condition accounts for some of the diarrheas associated with the various cachexias. The treatment here must be directed at the cause and will readily suggest itself in the different cases.

Constipation.—Constipation is the diametric opposite of diarrhea from the clinical viewpoint.

There are certain underlying factors governing constipation, among the most important of which are nervous influences and habits, improper diet, atony of the gastro-enteric tract, obstructions of various sorts, loss of sensitiveness to stimulation, and inflammatory conditions. Habit plays the most important rôle in this condition, i. e., the repeated suppression of the desire to defecate, and irregular hours for eating and drinking, which upset the orderly occurrence of this desire and account for at least eighty

per cent of the cases. A sedentary life with the loss of the stimulation due to muscular activity is another potent cause.

The habits of modern society in the matter of food preparation have led to the removal of most of the residual matter, so that the bulk of the feces is markedly reduced, and thereby an opportunity for a costive condition to develop is favored.

Highly seasoned and spiced food taken with strong alcoholic appetizers by nervous people who have not learned how to relax, are prime factors in the development of chronic constipation.

Vagotonia is a frequent underlying cause of spastic constipation.

After a certain time the constipated individual becomes anemic. This condition strikes at the very source of all vital activity, and especially lowers the tone of the muscular system; thus atony of the bowel is a natural sequence. The patient has usually, long before reaching this stage, become a confirmed user of cathartics, and he finally drifts to a physician because he wants something stronger than he can procure for himself, as all the common cathartics have failed him. In other words, his bowels have been educated up to a high degree of insensitiveness.

It stands to reason that functional disturbances may be the forerunners of organic changes. Atrophic catarrh of the enteric mucous membrane and a mild interstitial inflammation of the bowel wall, are more or less present, so that the natural fluidity of the bowel content and motility are both reduced.

Treatment.—There are various lines of treatment open. The first let us call "getting back to nature," which means so adjusting all the factors of the patient's life that the results will be in accord with our desires. It will require a subject who is willing and who can submit to a long and trying schooling. Cases amenable to such treatment can be cured. Then there are what may be termed the "hopeless cases" or those who will not or cannot do as they should, to accomplish a result. Here the treatment is one of whipping up the flagging powers of the intestine with a varied and judicious use of cathartic measures. Between these there are cases which may follow the middle course. I would strongly advise that due consideration be given therefore to the *class* to which the patient belongs before treatment is suggested, and to be practical rather than idealistic in the choice.

Not more than one in five patients in private practice, and hardly any among those of the dispensary type, is a subject for an *ideal line of treatment* consisting of a vigorous application of *rules of diet, careful hygienic living, modification of the habits and duties of life, institution of proper exercise and gymnastics* and the *removal of the invisible load of worry which tears down the vitality of so many.* Thus we proceed to discuss the *treatment of constipation* as it occurs in average cases where time, means, opportunity and, possibly, intelligence are limited.

The class of patients who consult one about an uncomplicated case of constipation usually overestimate the gravity of their condition and should be relieved of their unnecessary perturbation. Next, if they are people subject to the ordinary hours of business, get them up half an hour earlier than usual—and insist upon the use of an alarm clock for this purpose—so that there will be time to attend to the calls of nature. Advise the drink-

FIG. 173.—ABDOMINAL MASSAGE WITH DUMB-BELLS FOR CHRONIC CONSTIPATION. (Suggested by Dr. Hale Powers, Brookline, Mass.)

ing of a couple of glasses of water on arising. Hot water works best, but some patients will not persist long enough with any treatment they do not like, and with those if there is an aversion to hot water advise cold water.

Another factor is to see that your patient is sufficiently aroused to have a movement. This is best accomplished by the bath and cold sponge or shower. Emphasize the necessity for allowing at least fifteen minutes for

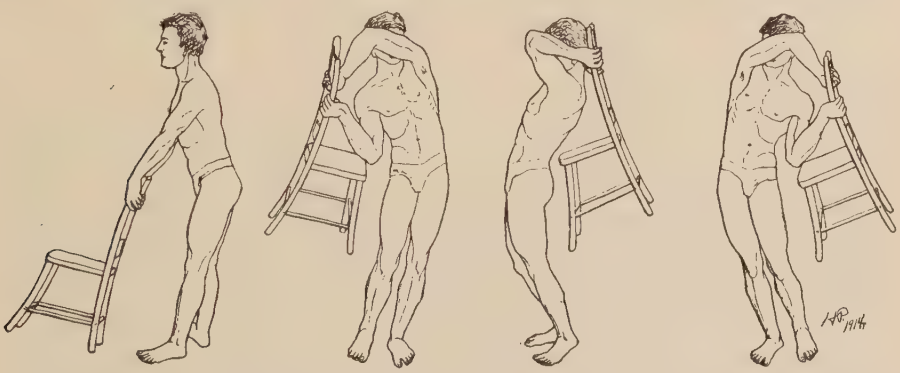


FIG. 174.—MUSCLE EXERCISES WITHOUT SPECIAL APPARATUS FOR CHRONIC CONSTIPATION. (Suggested by Dr. Hale Powers, Brookline, Mass.)

breakfast and for the taking of a fair sized meal. This is important because the digestive functions have not had any new material to work on for probably ten or twelve hours and peristaltic movements of the bowel may remain dormant all the forenoon unless sufficient food be taken to call forth their activity. The patient may be able to get a little exercise by walking to business, or at least several blocks of the way. Another good habit is always to walk downstairs instead of using an elevator. This causes very

little expenditure of energy but is quite a stimulus to peristaltic movement of the bowels. Advise foods that will leave sufficient undigested residue and eliminate any that are particularly binding.

Another good custom is not to partake of the evening meal immediately on arriving home, but to allow at least one-half hour to intervene before eating. This time may be advantageously employed in resting and, if practicable, bathing. The evening meal, which is almost universally the heaviest meal of the day, should be served in courses. This prevents "bolting" of the food with an undue mixture of fluids with solids and of necessity favors thorough mastication. A glass of water taken before retiring will also aid in passing on any residue left in the stomach. This is especially advantageous in cases associated with dilated stomachs as it is only in the recumbent position that these stomachs can be completely emptied.

The foregoing régime is intended for the average employed person and, while simple, is usually ample. I generally instruct my patients in the principles underlying these rules and then tell them to stick to them and besides avail themselves of any incidental chance of healthy exercise, recreation, etc., which may come to them. Lastly, I advise them to avoid taking cathartics unless the bowels have not moved for two days—when any one of those appended may be of service. Certain supposed virtues are attached to several drugs and they will be mentioned, although too much weight must not be put upon them.

Before going into drug action two more factors must be mentioned of a general nature. The first is that insufficient rest causes constipation, and the second is that too much rest does the same.

Concerning the quantity required of a drug necessary to produce a result, great variations occur in individuals, but it is wise to give enough to insure the result rather than to have to repeat the dose—because the failure of a cathartic to act only serves to impress the patient more forcibly with what he considers the gravity of his condition. The various preparations of cascara and phenolphthalein, tamarinds—lapactic pills, and laxative mineral waters—are the drugs especially adapted to meet the condition because there are no secondary effects worthy of note and they seem to hold their power for a long time.

Should there be stagnation in the lower bowel a glycerin suppository will be of service and is better than an enema as a routine practice. In case the feces become hard and impacted in the sigmoid one-half a pint of olive oil may be given per rectum to soften the mass. This is a better practice than using the large soapsuds enema as there is not the same danger of distending the bowel and augmenting the paresis already present.

Apart from the costive habit, conditions may arise such as indiscretions in diet, intercurrent diseases which require a thorough evacuation of the bowels, in which case we have a choice of enemas, calomel, salts, oils, and

vegetable cathartics or a combination of these. But this is purely incidental and has no part in the general treatment of the form of constipation under discussion. In some cases forcible dilatation of a rigid sphincter will be needed to overcome chronic constipation.

Obstructive and Reflex Constipation.—In intra-abdominal inflammation involving the peritoneum nature imposes *rest* upon the parts affected, and so with low grades of inflammation about the appendix, female generative organs, gall-bladder and hernial sacs there may be a strong inhibition of peristaltic motion. Another type is produced by purely mechanical difficulties caused by kinks, bands, misplaced organs, pressure of tumors, etc., and the relief of the condition must come from correcting the causative condition. In a large measure this is a surgical field.

Spastic constipation in vagotonics is best overcome by giving 1/200 grain of atropia several times a day. Benzyl benzoate in 2 to 10 drop doses, well diluted, may be also tried.

Fecal Impaction.—Fecal impaction may require breaking up of fecal masses when located in the rectal pouch. A spoon handle will answer for this purpose.

Hemorrhoids.—Hemorrhoids are varicosities of the vessels of the lower rectum and anus which develop symptoms on becoming inflamed or strangulated. The unsupported situation of the vessels, the absence of valves in the veins, and congestion due to obstruction in the portal circulation are potent factors in their formation.

Treatment.—In severe cases where pain, hemorrhage, tenesmus, and a sense of weight and fullness are severe, surgical measures are frequently needed; in milder cases less extreme measures will suffice. The sphincter muscle must be stretched to prevent spasm and the resulting tenesmus. This can be accomplished in the office by the introduction of graduated bougies on successive days or at once under general anesthesia. Even when a general anesthetic is used the stretching should not be done with the fingers, as tears more or less severe are unavoidable if the procedure is carried to the proper degree. On the other hand dilatation may be carried out with conical dilators without trauma far beyond the point necessary therapeutically.

The second consideration is to treat the anal and rectal mucosa which generates a strongly irritating secretion due to the catarrhal state engendered. Enemas containing boric acid (10 gm.), bicarbonate of soda (10 gm.), glycerin (15 c.c.), water (1,000 c.c.), will be found of service if used once or twice a day according to the severity of the condition present. A small soft rectal tube should be used to administer the enema rather than the usual hard rubber tip furnished with most irrigators.

There are several good suppositories which will also aid in toning up the mucosa, such as the following:

℞ Acid. tannic..... gr. iii 0,2
Ichthyol. ..... gtt. i 0,06
Butyr. cacao..... gr. x 0,6
M. ft. suppos. Sig. Introduce one twice a day;
or
Anusol Hemorrhoidal Suppositories
or
Kelsey Ichthyol Suppositories.
or
Medeol Suppositories.

The external parts are often still further irritated by the acid sweat imprisoned by the gluteal fold. The common practice of applying ointments only serves to further soften and macerate the parts, although at first it gives relief by preventing friction of the inflamed surfaces and, should the oily base become rancid, produces a new source of irritation. The following powders will meet the indications far better:

℞ Ac. boric.....
Bismuth. subnitrat..... āā ʒiiss āā 10,0
Zinc. oxid.....
Lycopod. .....
M. S. Apply thickly to parts on absorbent cotton.

℞ Stearate of zinc with acetanilid..... ʒiiss 10,0
M. S. Dusting powder.

The bowels should be kept open and the movements soft. If a cathartic is necessary the compound licorice powder will be found very efficacious.

During the acute exacerbations the pain and swelling may be severe. This necessitates the patient getting off his feet and taking to bed, so that the hydrostatic pressure in the inflamed area be lessened. Sometimes cold and sometimes heat gives most relief. The best way to apply cold is to put cloths wrung out in witch hazel against the anus and an ice bag next to this. If heat is to be used wring the cloths out in lead water and opium and apply a hot water bottle over this. As the condition subsides ointments may be substituted for the above treatment and one of the following may be found useful:

℞ Calomel ..... ʒi 4,0
Extr. opii..... āā gr. x 0,6
Extr. belladon.....
Vaselini albi..... ℥i 30,0
M. S. Apply on lint.

℞ Ex. opii..... gr. xv 1,0
Cocain..... gr. x 0,6
Menthol..... gr. xx 1,3
Ung. zinc. oxid..... ʒi 30,0
M. S. Apply locally.

Surgical Treatment.—Surgical removal of the redundant parts with clamp and cautery is generally best, as all the more refined surgical procedures are more often followed by infection. This is true in ligature or injection treatment.

Fig. 175.—Anal Prolapse.

Fissura ani.—Fissura ani is a split at the mucocutaneous margin, or sometimes higher, within the anus and usually shows very little tendency to heal spontaneously. The condition is very painful and besides may be the portal of infection for an ischiorectal abscess or a tuberculous fistula.

Treatment.—The treatment is to stretch the sphincters and scrape away any exuberant granulation tissue on the raw surfaces, which may then be touched with the silver nitrate stick. Finally cover the parts well with a dusting powder. The following are recommended:

℞ Ac. boric.....
Bismuth subnitrat..... } āā ʒiiss āā 10,0
Hydrarg. chlorid. mitis.....
M. S. Apply locally.

℞ Ac. boric.....
Hydrarg. chlorid. mitis..... } āā ʒii āā 8,0
Aluminis pulv.....
M. S. Apply locally.

Do not use any dusting powders with an iodin action, like iodoform or aristol, as they tend to promote secretion, which in this condition must be avoided. The bowels must have been thoroughly evacuated before the treatment is instituted and then kept constipated for three or four days thereafter, the diet in the meantime being light and chiefly fluid.

Anal Prolapse in Children.—Prolapse of the rectum is frequently ob-

served in anemic and rachitic children who have a relaxed sphincter and possibly some local irritation in the genito-urinary or rectal regions (stone, polypus, phymosis).

Treatment.—Strapping of the nates, bowel regulation, injections of cold alum water 1 per cent twice a day will usually overcome this condition.

In obstinate cases linear cauterization in the long axis of the protruding bowel is indicated or paraffin injections between skin and mucosa all around the anus may be employed.

Pruritus ani.—Pruritus ani can be due to local irritation or reflex causes. Of the local causes hemorrhoids, prolapse, uncleanliness, seat worms, pediculi, condylomata, and various affections of the skin and adjacent structures are the most common. Of the general and reflex causes, gouty and diabetic diatheses, nervous affections, hypertrophied prostate and the various toxemias are most common.

Treatment.—Treatment must necessarily be both local and general. The general treatment corresponds to conditions existing. The local treatment is the application of soothing and anesthetic lotions and salves, and lately the x-ray has been used with considerable success.

Some of the following local applications may be found useful:

℞	Phenol	gtt. xv	1,0
	Acid. salicyl	ʒss	2,0
	Acid. tartaric	gr. xlv	3,0
	Glycerite of starch ad	ʒiii ad	90,0

M. S. Apply to parts after cleansing.

℞	Menthol	ʒi	4,0
	Ung. zinc. oxid	ʒx	40,0

M. S. Apply locally.

℞	Pulv. camphorae	gr. xv	1,0
	Zinc. oxid	ʒiv	15,0
	Bismuth. subcarb	ʒiv	15,0
	Talci pulv	ʒiv	15,0

M. S. Apply on lint.

℞	Extr. opii	gr. xv	1,0
	Ung. gallae	ʒi	30,0

M. S. Apply on lint.

℞	Ac. hydrocyan. dil	ʒi	4,0
	Tr. opii	ʒii	8,0
	Potass. carb	ʒi	4,0
	Aq. rosae ad	ʒiv ad	120,0

M. S. Apply to parts.

℞	Ichthyol	3iss	6,0
	Ac. carbol	gtt. xv	1,0
	Glycerin	3iii	12,0
	Aquae	℥iii	90,0

M. S. Apply by means of gauze compresses.

In desperate cases the actual cautery or section of involved nerves is employed.

Fistula in ano.—This condition is divided into complete and incomplete varieties. The complete varieties present an internal opening in the bowel and an external opening about the anus. A secondary channel may run from near the internal opening quite a distance up under the mucous membrane. The incomplete variety may show simply an external opening on the skin, or an internal opening in the bowel.

Treatment.—The treatment is purely surgical. Under local or general anesthesia with the bowels previously well emptied, stretch the sphincter and then lay the fistulous tract open by means of a knife and grooved director. Cut or scrape away any scar or granulating tissue present and apply an iodoform gauze packing. Care must be taken not to cut the sphincter muscle through at more than one place. The aftertreatment is the same as for fissure.

Intestinal Auto-intoxication.—This is a condition produced by abnormal or excessive changes occurring in the alimentary contents, either by bacteriological or chemical action, which frees substances having the power to poison the system on absorption. Constipation favors but does not necessarily produce this condition. The chemistry, bacteriology and biology of auto-intoxication need not be discussed here.

Treatment.—The treatment is to evacuate and cleanse the alimentary tract. The first indication is therefore catharsis *irrespective of how the bowels have been working previously.* Calomel in divided doses followed by salts is perhaps the best way to induce this. Attempts may then be made to lower the bacterial content or change the flora of the intestine by the use of dilute hydrochloric acid, restriction of certain kinds of food, and the use of the Bulgarian bacillus. A saline mixture known as anti-auto-tox has some value in intestinal toxemia. Surgical measures for shortcircuiting the bowel are to be condemned.

Intestinal Worms.—These are divided into three classes, i. e., the flat or tape worms, the round worms, and the pin worms. The common forms of tape worms are the Tenia solium derived from the Cysticercus cellulosae of infected pork, the Tenia saginata developing from the Cysticercus bovis and the Bothriocephalus latus produced from an embryo found in infected fish. These worms are found attached by their head or scolex in the upper part of the small intestine and develop by a multiplication of segments till they may reach many feet in length. They may give no symptoms, cause

simple anemia, produce various gastro-intestinal disturbances or else reflex nervous complications.

Prophylaxis and Treatment.—The head must be removed or the worm will develop again no matter how many of the segments are cast off. There are many drugs and methods used to remove these worms but the one described here will be found satisfactory.

Commence treatment in the evening and administer calomel in a five grain dose. The next morning give a dose of Epsom salts, and after it has worked the patient should take a breakfast of salt herring salad and nothing else. This seems to especially disagree with the worms, probably by changing the osmotic tension. Two hours after breakfast give the following mixture:

℞	Oleoresinae filicis maris.....	ʒii	8,0
	Chloroformi	gtt. x	0,6
	Glycerin	ʒii	60,0

M. S. Give in three doses, one hour apart.

An hour after the last dose give another dose of salts and possibly an enema to carry away the paralyzed worm. The head should be searched for as no assurance can be given of a cure unless it is recovered.

The *long, round worms* represented by the *Ascaris lumbricoides* are removed by a daily half-grain dose of santonin followed by a laxative, but the *Oxyuris vermicularis* (pin worm) is a resident of the large bowel and must be reached by enemata.

The best treatment is, first, thoroughly to cleanse the colon with large soapsuds injections and then introduce a decoction of quassia made up by adding 30 to 60 gm. of the powder to 500 c.c. of water, or garlic boiled in milk in the same proportion. About half of this can be used at a time. The treatment should be carried out on several consecutive days when the bowel will usually be found free. If the genital organs have also been invaded especial treatment for them will be necessary.

For the *tape worm in children* 1/10 of the above dose may be administered, after the child has eaten pumpkin seeds for one week. If the medicine is vomited it may be given by means of a stomach tube. The following prescription has been used extensively by the writer with satisfactory results:

℞	Extr. filicis maris aether fl.....ʒii		8,0
	Emuls. ol. amygdalar. .....ʒii		60,0
	Extr. rhei fl.....	āā gtt. v	0,3
	Extr. aloes fl.....		
	Syrup. .....ʒvi		24,0

M. S. Give in three doses—at 8, 8.30, and 9 A. M.

B. Minor Ailments of the Respiratory Tract

(*See also Respiratory Diseases, Section VIII*)

Coryza.—Coryza, or an acute inflammatory process of the nasal and nasopharyngeal cavities, has in the large majority of cases a bacteriological factor augmented by such favoring elements as an over-dry or vitiated atmosphere, anything causing direct irritation of the mucosa, such as dust or some of the volatile and aromatic substances; any condition producing congestion of the part; certain of the diatheses and infectious diseases and occasionally vasomotor disturbances of unknown origin.

The condition passes through three stages. At first there is a suppression of the normal secretion and congestion. The second stage is one of exudation into the tissues and casting off of the cells of the mucosa and diapedesis of leukocytes altogether working to produce a purulent discharge. The last step is one of resolution or a subsidence into a low chronic type of inflammation.

Prophylaxis.—Persons in a lowered state of health should avoid contact with people who cough and sneeze. Nasal obstruction should be overcome surgically.

Treatment.—A cold at its inception can sometimes be aborted because the bacteria involved are within reach of antiseptic solution, also because the pathological picture has not progressed beyond that of simple congestion, which can be corrected by altering the blood distribution throughout the body by means of warm baths and a brisk cathartic. Locally we should contract the vessels and deplete the mucous membrane, for which purpose the following formula will be found effective:

℞ Sol. adrenalin chlorid (1:1000) ..... ℥ii 8,0
Cocain hydrochlorid ..... gr. v 0,3
Ac. carbol ..... gtt. i 0,06
Aq. rosae ..... ad ℥i ad 30,0
M. S. Warm and instill 20 drops into each nostril every three hours.

If the action does not seem to hold over for the three hours, its effect can be prolonged by spraying the nose with the following solution immediately after the anesthetic effect of the above solution has become sufficiently pronounced to prevent the development of very severe pain.

℞ Antipyrin ..... gr. iv 0,25
Aq. ..... ℥i 30,0
M. S. Spray nose as directed.

During this stage the excretions are not excessive and nasal douching has little value. Snuffs are poor preparations because they are hard to distribute over the surface properly and usually act in too strong a concentration over a limited area, thereby perhaps even augmenting the condition. Besides they are drying, and during this stage this of itself forms a contra-indication. The best preparations will be found to be inhalations and oily compounds applied either by spray or in the form of soft salves. Some suggestions for this part of the treatment are appended below.

℞ Ol. pini ..... ℥iiss 10,0
Menthol. ..... gr. vi 0,4
Ac. carbol. ..... gr. iii 0,2
M. S. Ten drops in 500 c.c. of boiling water. Inhale five minutes every three hours.

℞ Menthol. ..... gr. v 0,3
Ol. eucalypt. ..... gtt. xv 1,0
Petrolat. ..... ℥i 30,0
M. S. Apply on cotton. Swab nostrils every three hours.

Cathartics aid materially by the depletion which follows their action, and for this reason the salines work best.

The internal congestion can further be relieved by hot mustard foot baths, general hot baths and the use of diaphoretics. A hot whisky lemonade followed by 0,6 gm. (gr. x) of quinin sulphate or Dover's powder often acts well, but the patient should go right to bed.

After the initial stage has passed there can be no hope of aborting the condition and treatment must be supportive to limit extension. Locally the parts should be cleansed by an irrigation with luke-warm salt water. A small Birmingham or similar douche should be used and not the ordinary fountain syringe, as the pressure from the latter may be great enough to drive some of the fluid into the eustachian tube.

Such a simple cleansing will do as much good as the more highly antiseptic solutions, for the germs are by now well within the tissues. If snuffs are to be used at all the second stage offers the most opportune time because the secretion is profuse and quickly dissolves them. An example of such a medication is given below:

℞ Menthol. ..... gr. i 0,06
Sodii bicarb. ..... gr. ii 0,12
Magnes. carb. ..... gr. iii 0,2
Cocain. hydrochlor. ..... gr. ii 0,12
Zinc. stearat. ..... ℥i 4,0
M. S. Use as snuff.

The use of such preparations as follow are on the whole better, however, because they are more diffusible and not so easily rendered inert by precipitation with albuminous material:

℞	Sod. bicarb.	gr. viii	0,5
	Sod. biborat.	gr. viii	0,5
	Ex. pini canad. fld.	gr. xv	1,0
	Glycerin.	ʒii	8,0
	Aquae	ad ʒiv	ad 120,0

M. S. Use through atomizer.

℞	Camphor	gr. x	0,6
	Menthol	gr. v	0,3
	Eucalyptol	gr. v	0,3
	Albolin liq.	ad ʒi	ad 30,0

M. S. Use through atomizer.

The general management of this stage is quite important. Dilute hydrochloric acid (5 drops after eating), in water, will aid digestion. *Stimulants* may be necessary to overcome the depression, especially in old people. Sometimes the case takes a marked turn for the better on the administration of antirheumatic measures. Urotropin is indicated both as a curative and prophylactic measure, because it has been found to be excreted after ingestion on all mucous membranes, thereby directly attacking the germs at the point of invasion because of its antiseptic action and limiting their extension to adjacent uninvolved fields.

The stage of resolution may go on to cure without any need of further treatment, but sometimes the nasal mucosa seems unable to regain its original tone. Thereupon the local application of silver nitrate solution (gr. v to ʒiv of water) may be of service.

For internal administration iodotropon, iron tropon, or arsenic, are serviceable.

Some practitioners claim good results from the administration of stock vaccines and bacterins. A change of environment is usually beneficial.

Inflammation of the Accessory Sinuses of the Nose.—This condition may follow an acute coryza. Drainage is poor and so surgical intervention may be necessary to prevent serious complications.

This kind of work should be done by an able and conscientious specialist or it had better be left to nature.

Hay Fever.—Hay fever is an acute catarrhal condition of the respiratory tract usually starting as an acute coryza and due to the implantation and intoxication of various pollens in the nasal mucosa. There seems to be a peculiar hypersusceptibility in the individual affected, which

accounts for the asthmatic and other symptoms accompanying the affection.

Treatment.—Prophylactic treatment consists of a change of environment before the annual outbreak is due; often a sea voyage is advisable. In many instances the disease must be fought out *in loco*. The initial treatment should consist of a thorough catharsis and the local application of Dunbar's Pollantine in powder or ointment. These specific preparations are now obtainable in most shops.

In hay fever subjects with pronounced neurotic temperament the administration of a sedative is indicated as follows:

℞	Tr. belladon.	ʒi	4,0
	Potass. bromid.	ʒi	4,0
	Chloral hydrat.	ʒiiss	10,0
	Aq. destil.	ad ʒiv	ad 120,0

M. S. One teaspoonful three times a day after eating.

At the first opportunity cocainize the nose and then swab over the free edge of the turbinates with a three to five per cent solution of silver nitrate. This treatment has a decided effect on the amount of swelling occurring at these sites, where an unfavorable condition of hypertrophy frequently exists. Next swab out carefully all the accessible parts of the nose with the following solution:

℞	Ac. carbolic.	gtt. xv	1,0
	Borolyptol	ʒiii	90,0

M. S. Dilute with water (1:1). Swab the nose.

Finally roll two pieces of absorbent cotton with a probe into two loosely fitting plugs for the nose. Smear them thickly with the ointment given below and insert them. Direct the patient not to remove them for at least one-half hour after leaving the office.

℞	Camphor.	gr. xxx	2,0
	Eucalyptol.	ʒiv	16,0
	Ac. boric.	gr. xx	1,3
	Petrolat.	ad ʒi	ad 30,0

M. S. Apply in nostrils as directed.

Instead of the above, a five per cent solution of argyrol may be given the patient with instructions to put a few drops into each nostril three times a day. The treatment here outlined will often do away with the necessity of placing such dangerous drugs as cocain and morphin into the patient's hands.

Prophylaxis.—A person in a lowered state of health should avoid con-

tact with people who sneeze and cough. The constitutional treatment is practically the same as that of coryza. Stimulants, such as whisky and champagne, will be found of service, especially in patients with a feeble circulation. As in all general infections, the bowels must be kept open, and digestion aided by the administration of dilute hydrochloric acid. Vaccins and bacterins may be tried.

Obstruction of the Nasal Passages.—Obstruction of the nasal passages is due to hypertrophied turbinates, deviated septum, polyps, new growths, congestion of the mucous membrane, and accumulation of the secretions.

Treatment.—The severer grades of purely anatomical obstruction require surgical intervention. When the hypertrophy of the turbinates is largely in the mucous covering, linear cauterization along the free margin from behind foreward with strong trichloracetic acid on a slender cotton swab will produce a scar which on contraction will draw up the slack tissue and so prevent excessive swelling. The operations for deviated and dislocated septum is a subject beyond the scope of this work. Polyps can be snared off, but they usually arise from a diseased piece of bone which must be removed, or recurrence follows. New growths may be malignant or benign, grow forward or backward, and present a purely surgical problem. Congestion of the mucous membrane can be temporarily diminished by the instillation of a solution of adrenalin. Secretions within the nose can be douched away or loosened up by alkaline douches and sprays mentioned under Coryza.

Foreign Bodies in the Nose.—Foreign bodies in the nose can usually be removed with suitable forceps and with the aid of a head light after the pain and swelling have been reduced by the application of a solution of cocain and adrenalin.

Nosebleed.—Nosebleed of the ordinary variety is caused by an intense hyperemia of the nasal mucous membrane and can be controlled by anything which will contract the vessels. This hemorrhage usually takes place from the anterior part of the septum, and so is readily accessible. The hemorrhages occurring further back in the nose are usually from larger vessels and require especial treatment.

Prophylaxis and Treatment.—In all cases see that the patient sits upright with the head held in line with the body and that there is nothing constricting about the neck to hamper the venous return flow from the head. A cold wet cloth or an ice bag placed against the nape of the neck reflexly causes a contraction of vessels. If the bleeding point can be seen the area can be cauterized or styptics applied and the hemorrhage controlled. The drugs used for this purpose are the silver nitrate stick, alum, actual cautery, cocain, adrenalin, tincture of iodin, or the tincture of ferric chlorid. This latter forms an extensive clot and should be applied only when other methods fail. When the bleeding point cannot be seen sprays of adrenalin chlorid and cocain, or peroxid of hydrogen, may stop

the bleeding. In the severe types of hemorrhage the anterior nose or the nasopharynx must be packed.

Technic of Plugging for Severe Nosebleed.—Prepare a pad of iodoform gauze, consisting of about twelve to sixteen layers, and of the size of a silver half dollar. Fasten this pad at its center by a double thread of strong cotton and leave the ends of the string about a foot long. To get the pad in place pass a small catheter through the side of the nose from which the bleeding comes and hook out the catheter with the finger or forceps through the mouth, as soon as the tip presents in the pharynx. Fasten the ends of the threads left attached to your pad to the tip of the catheter and then withdraw the catheter. This draws the threads into the mouth and up through the nasopharynx and out of the nose. By pulling on the threads the pad can be easily carried back to the soft palate, where it usually sticks. The finger will readily help it past this point and then it can be drawn snugly into its place. Now separate the two parts of the double thread as widely as possible and between them insert an absorbent cotton plug, about three inches long and as thick as a lead pencil, dripping with hydrogen peroxid. Care must be taken to carry this all the way back to the plug. Now pack the anterior nose with a strip of iodoform gauze, being sure that the ventricles are filled, or bleeding will occur around the packing. Lastly tie the two threads between which the packing has been placed down firmly on the mass, thus firmly anchoring the posterior plug. This dressing must be loosened up with hydrogen peroxid and removed at the latest after forty-eight hours. It may be replaced by a fresh tampon if necessary.

In hemophilia horse serum will materially aid the clotting capacity of the blood and should be given in doses from one to two ounces by hypodermic injection. Alcoholism seems to create special predisposition to hemorrhage, particularly in men past middle life who had been high livers in their earlier days. In this class of cases the horse serum works remarkably well.

Chronic Rhinitis.—Chronic rhinitis usually takes its inception in repeated acute attacks, which finally leave the mucous membrane somewhat thickened and vulnerable, so that the resistance to further attacks of irritating agents is progressively less and less. The condition is usually not evenly distributed but especially involves the turbinates and schneiderian membrane. Sometimes circumscribed areas deeply congested and hypersensitive are found which, if mechanically irritated, will produce a typical attack of hay fever. The treatment is cleansing of the parts and the application of iodin to the mucous membrane. This should be done by the physician thoroughly from one to four times a week. The following solution may be used for the purpose:

℞ Iodin. ..... gr. v 0,3
Potass iodid. ..... gr. xv 1,0
Glycerin ..... ℥i 30,0
M. S. Apply with a swab.

The hyperesthetic spots had best be destroyed by the actual cautery. If the hypertrophy of the mucous membrane becomes excessive, especially over the turbinates, and thus interferes with nasal breathing, it should be excised. Chronic rhinitis may end in atrophy of mucous membranes and occasionally in necrosis of the bones. These conditions require that the hard mucopurulent crust forming over them be removed, probably best by hydrogen peroxid, the application of iodin as mentioned above, and operative removal of necrosed bone. The ozena may be overcome temporarily by the following douches until the cause can be removed.

℞ Potass. permanganat. ..... gr. xxx 2,0
Tr. myrrhae ..... ℥ii 60,0
Aquae ..... 1 pint 500,0
M. S. Use as a douche twice a day.

or

℞ Creolin ..... ℥i 30,0
S. Five drops to small milk pitcher of warm water. Use as douche three times a day.

In fetid ozena which does not respond to ordinary treatment an attempt should be made to prepare and administer an autogenous vaccine as a supplement to local measures. Deep breathing in fresh air, tonics, bowel regulation, and physical exercises should be advised.

Nasal Diphtheria.—Nasal diphtheria must be spoken of here, not particularly when part of an acute, frank infection, but when exhibiting a subacute mild grade of inflammation with little or no general reaction—as found in "carriers" of the disease (larved diphtheria).

Treatment.—The antitoxin treatment and spraying the nose with one-quarter of one per cent of formalin in water will overcome the infection. Lanolin may be smeared into the nostril to prevent excoriation of the skin. The patient may use ten per cent argyrol solution to instill into the nostrils at home.

Syphilitic Lesions in the Nose.—Syphilitic lesions are usually either secondary or tertiary and require the usual systemic treatment and local applications of mercurials. The following will be found of service:

℞ Ung. hydrarg. ammon. } āā ʒiv 15,0
Petrolat.
M. S. Apply on swab.

℞ Hydrarg. chlor. mitis } āā ʒii 8,0
Lycopodii
M. S. Use as snuff or apply directly to lesions.

Attention must be called to the fact that mercurials in overdose can themselves produce ulcerations in the nose and if these are mistaken for luetic ulcers, pushing the treatment will only make them worse.

Nasal Hydrorrhea.—This condition may be due to vasomotor and other disturbances. Astringent douches are indicated in this class of cases.

Acute Pharyngitis.—Acute pharyngitis is due to chemical irritation or infection and should be treated by bland antiseptic gargles and sprays (*See* Nasopharyngeal Toilet, Section I), cold cloths applied to the neck, and thorough catharsis. Many of these cases have a rheumatic basis and require salicylates internally.

Dobell's solution forms a good gargle, but if for variety sake a few others are needed any of those below may be used.

℞	Potas. chlorat.	ʒiss	6,0
	Alcohol.	℥ii	60,0
	Glycerin.	℥ii	60,0
	Aq. destill.	℥viii	240,0

M. S. Use as gargle.

℞	Zinc. chlorid.	gr. xviii	1,2
	Glycerin.	ʒiv	15,0
	Aq. rosae	℥i	30,0
	Aquae	ad ℥viii	ad 240,0

M. S. Use as gargle.

℞	Ac. salicyl.	ʒi	4,0
	Sod. biborat.	ʒii	8,0
	Tr. myrrh.	ʒi	4,0
	Aquae	ad ℥viii	ad 240,0

M. S. Use as gargle.

Chronic Pharyngitis.—Chronic pharyngitis presents a dry, glazed, or rough, raw appearance of the mucous membrane. A dry tickling in the throat, producing cough, is a most distressing symptom.

The treatment that will permanently benefit the patient is to paint the affected parts with a five per cent solution of silver nitrate at the office

and give the patient a bland gargle to use at home, with directions to return for another treatment in a week. A good deal of the hypertrophied adenoid tissue will have disappeared and the mucous membrane will look fresher. Keep this up until the back of the throat is smooth, moist, and fresh looking and the vessels have contracted down to a normal appearance. Then order benzoinated albolene in spray form to be used twice a day.

The nasopharynx must not be neglected in these conditions and the following application carried on a swab up into this space is helpful:

℞	Ac. tannic.	℥i	4,0
	Alumnis	℥i	4,0
	Glycerin.	℥iv	15,0
	Aq.	℥iv	120,0

M. S. Apply to nasopharynx.

The iodids given internally also seem beneficial and may be prescribed as follows:

℞	Potass. iodid.	℥ii	8,0
	Syr. sarsaparillae co.	℥i	30,0
	Aq. destil.	℥iii	90,0

M. S. One teaspoonful diluted three times a day after meals.

Iodotropon, also, may be taken in tablets—two each day.

Certain habits, such as chewing, smoking, and the drinking of strong alcoholic beverages must be interdicted and the patient should be told that automobiling along dusty roads is bound to keep up the irritation in the throat.

Hypertrophic Adenoid Tissue in the Nasopharynx.—Hypertrophic adenoid tissue in the nasopharynx interferes with nasal breathing and favors local and middle ear infection; also it may be responsible for minor thoracic deformities in children and a stupid staring facial expression. The only treatment worthy of consideration is radical removal by curet or sharp cutting forceps.

By examination before curetting the size and location of the growth can be made out and injury to the eustachian tube avoided. An examination after the operation puts your mind at rest as to the completeness of the work done and also acquaints you with the presence of attached threads which cause irritation as they dangle into the pharynx.

Acute Tonsillitis.—Acute tonsillitis may only involve the superficial parts; more commonly the crypts are the seat of disease, the whole gland may be involved and the peritonsillar structures may become invaded, with abscess formation as the end result.

Treatment consists in painting the affected parts with a five per cent

silver nitrate solution once or twice a day, opening up any crypts in which there is retention, and opening up pockets between tonsil and pillars and giving antiseptic gargles. The salicylates internally are frequently serviceable.

Leptothrix of the Tonsils and Pharynx.—Circumscribed small white patches on the tonsil surface are sometimes due to leptothrix. The symptoms are not pronounced.

Treatment consists of swabbing the plaques with tincture of iodin, or five per cent argentic nitrate solution, or destroying them with the curet or actual cautery.

Quinsy Sore Throat.—This is a peritonsillar inflammation usually going on to abscess formation, the site of election for the opening of which is usually above the tonsils.

Hypertrophied tonsils, which either obstruct respiration or are the frequent seat of disease, should be removed. There are two methods in vogue.

Tonsillotomy, or the removal of part of the gland usually with a tonsillotome, is the one most often practiced and the best routine measure. It lays the deeper parts of the crypts open, removes enough tissue to give air space and leaves enough tissue to afford protection to the carotid capsule, and in younger children to produce the internal secretion with which it is accredited. *Radical tonsillectomy* is performed with scissors and finger or by the so-called Sludor method, by which an enucleation is accomplished. This operation is necessary only in very severe cases, frequently associated with quinsy (*see also* Section VIII).

Hemorrhage from the Tonsil.—This usually occurs during attempts at removal and, if severe, may require a ligature of the vessel.

In most instances hemorrhage can be stopped by sucking ice, or gargling with alum water, or compressing the bleeding stump with the thumb and a cotton tampon soaked in alum water or in thromboplastin.

Lingual Tonsil Cough.—A congested lingual tonsil, as the cause of a troublesome dry cough, may occur without laryngitis, tracheitis, or bronchitis. It not infrequently follows influenza and is apt to recur with every so-called cold. When the hard rasping cough produces a blood tinged mucus, the patient may be suspected of having incipient tuberculosis.

The laryngoscopic examination shows the lingual tonsil at the base of the tongue to be red and inflamed, with large papilla projecting from the mucous membrane.

Treatment.—The only rational or satisfactory treatment in this condition is local treatment. The irritated glandular tissue should be swabbed daily or every other day with a two per cent solution of silver nitrate or with the following solution:

℞ Iodi ..... gr. viii 0,5
Potassii iodidi ..... gr. xxii 1,5
Glycerini ..... ʒiv 15,0

Smoking should be interdicted and a dust-laden atmosphere avoided. Cough mixtures containing codein or heroin and ammonium chlorid will allay this cough but not cure it; moreover they upset the stomach.

Alkaline gargles (Seiler's tablets, in solution, or the officinal liquor antisepticus alkalinus) may be employed; also gargling with a watery solution of tannic acid and glycerin is a useful procedure in a flabby throat.

Formamint tablets, three to four a day, slowly dissolved in the mouth, sometimes ease the cough; and a spray of benzoinated albolene at night before retiring is particularly soothing to an irritated pharynx.

In contractable cases ablation of the lingual tonsil is indicated.

Relaxed Soft Palate.—This is a frequent cause of coughing and irritation. In mild cases astringent gargles are all that are needed. Painting with silver nitrate will also be of benefit; about a ten per cent solution should be used. When the uvula is very long it should be clipped off under cocain anesthesia.

Swelling and Edema of the Uvula.—This phenomenon is usually a part of a local inflammatory process and is sometimes observed in chronic Bright's disease.

Treatment.—Astringent antiseptic gargles and cold in the form of cracked ice, which is allowed to melt in the mouth and then swallowed, should be advised.

In patients suffering from chronic nephritis, a swollen uvula should not as a rule be amputated, as severe hemorrhage is liable to follow.

Acute Laryngitis.—Acute laryngitis is caused by exposure, irritating dust and vapor, infections and excessive use or over-exertion of the voice.

Treatment.—The treatment is depletion by cathartics and either cold or hot applications to the neck, and locally steam inhalations and spraying or swabbing the upper larynx with a four per cent cocain solution followed by adrenalin or a four per cent antipyrin solution, or with nitrate of silver solution (10 grains to the ounce of water).

Powder insufflation is not practiced much nowadays in acute cases. The inhalation of benzoinated albolene in the form of a fine spray is to be preferred, or of camphor spirits dropped into boiling water.

Finally painting the larynx with five per cent silver nitrate solution will usually restore the normal tone.

Simple Chronic Laryngitis.—Simple chronic laryngitis results from an uncured acute attack or continuous exposure to unfavorable conditions (dust). Its chief symptom is hoarseness and more or less discomfort in speaking. Painting the larynx with silver nitrate solution (5 per cent) or with a sulphate of zinc solution (3 per cent) is good treatment.

In every case of chronic hoarseness, the nasopharynx should receive attention as well as the larynx.

Singer's Nodes.—Singer's nodes are papillomatous growths occurring on the vocal cords of singers and speakers and having a tendency to cause the voice to "crack."

Their removal is really the work of a specialist, but if one is skillful with the laryngeal mirror they may be touched with some solid silver nitrate or trichloracetic acid fused on the end of a probe. A local anesthetic should be utilized for this operation.

Syphilitic Laryngitis.—Syphilitic laryngitis occurs as a diffuse infiltration and hyperemia and as a gummatous deposit. The treatment is the usual constitutional one and locally the application of silver nitrate (ten per cent strength), also orthoform if pain is severe, will be indicated.

Cicatricial Adhesions Between the Vocal Cords.—These occur as the result of old lesions of the larynx and may require ablation.

Cold on the Chest.—Cold on the chest is a catarrhal inflammation of the tracheal and bronchial mucous membranes. The onset is usually sudden, but may be gradual when extending downward from a higher point in the respiratory tract.

Prophylaxis.—Persons in a run-down condition or those already afflicted with a "cold" in the head (nasopharynx) should avoid the impure air of crowded places and avoid contact with people who cough or sneeze.

Treatment.—Rest in bed, catharsis, hot drinks, hot baths, and the use of diaphoretics, such as Dover's powder, aspirin, quinin, etc., are indicated during the first stage; subsequently expectorants and stimulating measures are needed.

In the subsiding conditions tonics, nourishing food, sedatives and cough mixtures make up the treatment. A number of formulae for these purposes follow:

℞	Codein. sulph.	gr. v	0,3
	Ac. hydrocyan. dil.	ʒi	4,0
	Ammon. chlorid.	ʒi	4,0
	Syr. pruni virg.	ʒiii	90,0

S. One teaspoonful occasionally to check cough.

℞	Syr. ipecac.	ʒiv	15,0
	Suc. limonis	ʒiv	15,0
	Potass. bicarb.	ʒi	4,0
	Sp. etheris nitrosi	ʒiv	15,0
	Aq. destill. .....ad	ʒiv	ad 120,0

M. S. One teaspoonful every four hours—expectorant mixture.

℞	Ammon. chlorid.	ʒi	4,0
	" carb.	ʒi	4,0
	" bromid.	ʒi	4,0
	Ex. glycyrrhiz. fl.	ʒii	8,0
	Aq. destill.	ʒiii	90,0

M. S. One teaspoonful every four hours.

℞	Terebene	ʒi	4,0
	Creosot.	gtt. x	0,6
	Mucil. acaciae	℥iss	45,0
	Aq. chloroformi	℥iss	45,0

M. S. One-half teaspoonful diluted every four hours.

Pleurodynia.—Pleurodynia is a loose term denoting pain in the side, and must not be confused with intercostal neuralgia, herpes, periostitis of the ribs, etc. The term should be restricted to those cases which present a hyperesthetic state of the parietal pleura not due to actual inflammations, termed *pleurisy*. The condition seems to be associated with the toxemias due to faulty metabolism and intestinal putrefaction. Counterirritation, cathartics, and antirheumatic remedies meet the conditions present.

A glass of lemonade to which an even teaspoonful of cream of tartar has been added may be of service. Chloroform liniment applied over the painful area is a good suggestive pain killer.

C. Minor Ailments of Bones, Muscles, Joints, etc.

(*See also Section XI*)

Back Ache.—Back ache, especially when in the lumbar region, is usually taken as a sign of kidney disease—when in reality the ordinary chronic forms of nephritis rarely produce pain.

A displaced or movable kidney may cause pain referred to the back, due to the strain put upon its pedicle. This same principle applies to general visceroptosis, when all the organs drag on their anchorage. The weight of a continually overfilled colon may produce pain in the back; also misplacement or inflammation of the pelvic organs, and pressure from any source on the lumbar nerves may provoke the symptom. Or there may be a neuritis situated in the posterior nerve roots, or a myositis of the muscles of the back from injury and overstrain. Probably the most common cause is due to faulty carriage, as from high-heeled shoes, which change the natural curves and contour of the spine and place

uneven or excessive strain on certain muscles and ligaments. The sacro-iliac joint is most often affected.

Flat foot must not be overlooked as a cause of back ache. There may also be rheumatic and gouty affections of the joints to account for the pain, and a combination of any of the above mentioned may exist.

Treatment.—The treatment is therefore as diverse as the cause. Faulty carriage must be corrected; sprained muscles and tendons require rest, counterirritation, or massage; misplaced organs require an abdominal support; rheumatic and gouty conditions need constitutional treatment; pelvic conditions must be corrected; constipation must be overcome.

The ordinary liniments have little more than a psychic effect, but the application of dry cups, electric brush, compresses worn over night, and massage are the therapeutic agents to be employed. Syphilis, tuberculosis, and malaria are underlying factors and must be considered and treated. In obscure cases a Röntgenogram may give the diagnosis and indications for treatment.

Limping.—Limping is produced by pain, paresis of muscles, muscular cramps, periostitis of the tibia, inequality of the length of the legs, flat foot, angioneurotic conditions, loss of sensation, paresthesias, etc.

Pain need not necessarily be in the leg to cause limp. Intra-abdominal pain produces a very characteristic limp, the patient walking "doubled up" as the common expression describes it. A weakness of the muscles or a cramp, *i.e.,* tonic spasm of the muscles of one or both legs, will cause a limping gait. A condition of periostitis of the tibia frequently called "painful shins" may cause such a reflex spasm that walking is almost impossible. Hip disease, spinal curvature, etc., may cause an actual or apparent inequality in the length of the limbs. Flat foot causes pain and limp by producing a chronic sprained condition of the smaller joints forming the pedal arch. False sensations and lack of sensation cause limps due to uncertainty of position. Angioneurotic and sclerotic conditions of the vessels produce the curious phenomenon called *"intermittent lameness or limp."*

Should the need for a definition of a limp be required it might be given as a gait in which the length of the steps taken by the two feet are unequal or in which the strides follow each other arrhythmically. There may be a slouching movement on the affected side to prevent jarring.

Treatment.—The treatment will be rest and antiphlogistic measures for inflammatory cause, correction or compensation of deformities, tonics and nutrients for weakness, sedatives for spasms, and proper measures to control vasomotor disturbances when present. This latter indication is best met by mechanotherapeutics in conjunction with baths, massage, and electricity.

Periostitis.—Periostitis resulting from blows and accidents of various sorts is of frequent occurrence and often renders what appears like a

trivial lesion, very painful. Many of the deep reflexes arise in the periosteum and an injury to this structure may cause distant symptoms hard to explain, and may simulate lesions not present.

Treatment in Periostitis.—The application of heat seems to afford most relief and perhaps the best way to apply heat is by means of a hot water bag or a kaolin poultice, advertised under the name of *"antiphlogistin."* Pain is controlled by analgesics and rest of the injured part. After the acute symptoms subside an iodin or ichthyol ointment applied locally may hasten the cure.

Muscular Rheumatism.—Muscular rheumatism is another condition in which a definite name is applied to an indefinite pathological condition.

Inflammatory reaction or evidences of exudation (lumps) within the muscles are found in some cases of muscular rheumatism, but not in the majority of cases. A neuritis of the nerve terminals within the muscles better explains the condition in view of the fact that intestinal toxins have a selective affinity for certain nerves.

Treatment.—Treatment consists in bowel regulation, exercise, massage, and a few trial doses of quinia sulphate or sodium salicylate.

The injection of normal saline solution into the muscle has been suggested as a means of producing, first, pressure anesthesia and, secondly, the washing out of toxic substances by its absorption. Dry cups, galvanism, and the spark from a static machine are popular therapeutic measures. High grades of dry heat, Russian or Turkish baths, and electric light baths facilitate elimination of toxic material by the sweating induced.

Occupational Cramps.—Occupational cramps, of which writers, telegraphers, typists, and piano and violin players are the principal sufferers, represent the exhaustion of a neuromuscular system by overwork.

The lesion may be a neuritis but is probably more commonly a myositis of a degenerative type. The muscles are capable of doing a certain amount of work, after which they become tired. In other words, the supply of readily combustible material in the sarcoplasm is exhausted and the products of metabolism have accumulated to an extent that the muscle needs rest to readjust itself. If given this rest demanded, the muscle can go on with its work with normal vigor, but if forced to work in spite of itself, some of the more stable parts of the elemental structure of the fiber give way and a lesion is produced. This condition is what we all have experienced after taking vigorous unaccustomed exercise.

Now if such a state of affairs is brought about often, one of two things must happen: either there must be a compensatory hypertrophy to meet the excessive demands, or the muscle must disintegrate. This disintegration is a molecular matter and certain fibers will have progressed further than others at any given time. The products of disintegration are toxic to the functionating fibers and tend to cause spasmodic contraction. The clinical picture is one of actual loss of strength in the group of muscles

affected and a tendency to spasm on the resumption of the causative activity.

Prophylaxis and Treatment.—The condition requires rest, washing out of the muscles as it were of the accumulated débris, combined with a tonic upbuilding regimen. The rest referred to is that of passive motion. The muscles should be flushed out by gentle massage and by the application of heat and electricity.

A Bier bandage high up on the extremity may be applied—long enough to get the parts hyperemic, then it is removed and a snug elastic bandage is applied, starting at the distal and working to the proximal end. This effectively empties the limb. This can be repeated several times at a sitting, and several times a day a milder grade of the same treatment can be performed by elevating and lowering the limb. The limb and body generally should be kept warm so as to reduce the necessity of combustion for heat maintenance to a minimum. After improvement in the condition commences to show itself then light exercise, massage, cool sponging and electrical stimulation will be found beneficial. General tonics and hygienic measures should be taken as for a person recovering from a subacute ailment.

A question that will interest your patient is whether he can resume his old occupation. Frequently, with reasonable restrictions, you can answer in the affirmative. The first point to insist upon is that your patient be absolutely recuperated before he attempts any of his accustomed work which has brought on the trouble. Next that he only moderately exert himself at any time and that he interpose periods of rest. Lastly that he pay attention to his general health and stop excessive smoking, drinking, and late hours or any other pernicious indulgence.

Bursitis.—A bursitis may simulate a nerve or muscle affection and should be looked for in examining a painful part.

Treatment.—It should be treated by rest, cold or hot applications—according to which is most grateful, drainage if infected, excision if continuously hypersecreting.

Weak Ankles.—Weak ankles, sometimes leading to flat foot, are caused by inherent weakness of the parts or an excessive body weight.

Prophylaxis.—The child should be taught to *toe-in* when walking, and should be fitted with proper shoes, elevated along the inner margin, if necessary, and supported by an upright from a sole plate, extending to just below the knee if the case is marked. Plates are of service to adults; broad low heels are of greater service.

D. Minor Ailments of the Eye and Ear

Ailments of the Eye

Foreign Bodies in the Eye.—Foreign bodies in the eye are harmful, both from mechanical irritation and sometimes because of chemical action.

Treatment.—Any foreign body having a caustic action should be washed out of the eye with an antagonistic solution as, for instance, an alkaline one for an acid irritant or *vice versa.* If spasm of the lids prevents examination, cocainize the lids and conjunctiva with a two per cent solution, and if visible, wipe away the offending particle with a pledget of cotton moistened in a saturated solution of boric acid.

To explore the undersurface of the upper lid and fornix, grasp the lashes firmly between the thumb and index finger of one hand and pull the lid downward and away from the eyeball so that air may enter between them. The other hand should rest firmly against the forehead with the fingers pointed upward toward the crown and the thumb turned downward in the opposite direction and extended over the eyebrows, so as to rest on the highest part of the lid which is pushed backward by it against the upper part of the globe of the eye. Now a double movement is required to evert the lid. The thumb, resting on the eyeball, is extended downward and the fingers grasping the lashes quickly turn the lid over this. The thumb against the eyeball is withdrawn from the pocket thus formed and is used to maintain the lid everted.

To expose the fornix push the lower lid up under the everted upper one and this will bring the fold into view. Any foreign body secreted here can be easily removed.

In case the foreign body is in the corner under the lid, be especially careful not to attempt to wipe it away but to catch it on the cotton by a patting motion. This will prevent any unnecessary scratching. If it is firmly embedded it is better to remove the particle with a scalpel, wash out the eye and treat as a simple conjunctivitis.

Styes.—Styes are infected follicles of the eyelids. In their incipiency they present an inflamed acuminated papule surmounted by a lash. Later this breaks down and pus forms. The condition is favored by general debility.

Treatment.—If breaking down has not occurred it may be hastened by hot applications to the eye; absorbent cotton dipped in hot boric acid solution will answer. The applications should be made for ten or fifteen minutes every two hours. As soon as the development of a yellowish head shows that an abscess is in course of formation, extract the hair of the follicle involved. This permits drainage and a better application of medicaments. The eye should be frequently cleansed with boric acid solu-

tion and a five per cent solution of argyrol should be instilled once or twice a day.

If recurrences are frequent the lids can be brushed with a two per cent silver nitrate solution. A salve of the yellow oxid of mercury—two and one-half per cent strength, applied to the lids with a glass rod, will prevent adhesion of the eyelashes and carry on the antiseptic action through the night.

General tonics are of value and in very severe cases it may be worth while to administer an autogenous vaccine.

Meibomian Cysts.—These are caused by obstruction of the ducts. The condition may give rise to annoyance on account of its size or because it becomes infected.

Usually when symptoms arise, the cyst must be removed through a vertical incision on the more accessible side of the lid.

The aftertreatment follows along the usual surgical lines.

Catarrhal Conjunctivitis (*Pink Eye*).—Catarrhal conjunctivitis occurs in an acute, a chronic, and a follicular form. Irritation and the milder grades of infection are responsible for the condition.

The treatment is rest and protection for the eyes, frequent bathing with boric acid water, toning up the conjunctiva with one of the mild silver preparations like argyrol, protargol, or alum in glycerin.

Purulent Conjunctivitis.—Purulent conjunctivitis includes, as its chief variety, the gonorrheal infection. This condition requires the use of frequent washing with boric acid solution, the instillation of a two per cent silver nitrate solution twice a day, the continuous application of iced cloths in the early stages and their intermittent use later and the use of a one to three thousand bichlorid of mercury salve about the lids.

Prophylaxis is important in this condition and includes the Credé method of treating the eyes of newborn children with a two per cent silver nitrate solution, the use of a shield to protect the healthy eye if only one is affected, and care of towels and other linen which might be the cause of inadvertently spreading the disease.

Membranous Conjunctivitis.—This may be a real or a pseudo diphtheritic affection.

The treatment is the same as recommended for the gonorrheal variety, except that in a real diphtheritic case the antitoxin treatment is indicated.

Granular Eyelids (*Trachoma*).—Granular eyelids is a chronic affection of the submucous and mucous tissue, having acute exacerbations and causing permanent deformity of the parts with serious sequelae if left untreated. The typical picture is one of hypertrophy of the conjunctiva causing the production of papillomatous folds and a deposit in the submucosa of small pearly bodies, which on microscopic examination resemble adenoid tissue.

The best treatment is expression of the granules and the application

of copper sulphate stick, together with the usual cleansing applications. The condition is communicable, so due care must be exercised.

Phlyctenular Conjunctivitis.—Phlyctenular conjunctivitis resembles trachoma in appearance but usually occurs on the lower lid instead of the upper, as in the former disease. It is not dangerous and frequently heals spontaneously without leaving any unpleasant sequelae.

The treatment consists in cleansing applications of two per cent boric acid solution, with an occasional touching up with mild copper sulphate or argentic nitrate solution.

Ailments of the Ear

Frostbitten Ear.—A frostbitten ear is one in which exposure to cold has created a vasomotor disturbance, owing to which an initial anemia of the parts is followed by a secondary marked congestion.

Treatment.—If seen in the acute stage the temperature must be slowly brought back to normal and the circulation stimulated by rubbing with snow or with a sponge wrung out in ice water, or like measures. After the circulation has been somewhat restored a wet dressing of alcohol and water (equal parts), or a weak ammonia water should be applied. Ulceration may occur and should be treated in the ordinary way and, if sluggish, should be stimulated by the application of a five per cent silver nitrate solution or ten per cent Balsam of Peru ointment.

The part usually remains more or less sensitive to thermic changes and is often intensely itchy. The following salve may relieve this latter condition:

℞	Menthol.	gr. v	0,3
	Chloral. hydrat.	gr. x	0,6
	Camphor.	gr. x	0,6
	Adipis	℥i	30,0

M. S. Apply at night.

Bier's hyperemia, by means of a suction or cupping glass, and applications of hot air are said to remove many of the sequelae of old cases.

Eczema of the Ear.—Eczema of the ear is often very annoying and even painful, especially in infancy.

Treatment.—The parts should be cleansed and the scabs removed by gently mopping with absorbent cotton wet with a solution of bicarbonate of soda. The parts must be carefully dried and a dusting powder applied.

Stearate of zinc with acetanilid or aristol are very good for the purpose. In the later stages and in the dry scaly forms ointments containing acetate of lead or ichthyol or bismuth carbonate or zinc oxid, may be employed.

Furunculosis of the Auditory Canal.—This is extremely painful because of the close adherence of the skin to the underlying structures.

Treatment.—The treatment of the early stages is to paint the area affected with tincture of iodin. When the papule is developed incision gives relief from the tension and then the ear can be swabbed with a one to five thousand bichlorid of mercury solution or another mild antiseptic solution.

Pain in the canal is best relieved by a *limited* application of a ten per cent solution of carbolic acid in glycerin on a swab, or by a four per cent cocain solution; also a hot-water bag to the ear gives relief.

Ear Ache.—Ear ache, one cause of which has just been mentioned, may also be caused by a middle ear inflammation; or neuralgia in the nerves about the external ear may simulate true ear ache.

Emergency Treatment of Ear Ache

Heat against the side of the head can be applied by means of a hot-water bag or poultice. Warm boric acid water containing two per cent of cocain dropped into the ear every hour or two usually relieves pain. Warmed oil of hyoscyamus (ol. hyoscyami coctum) answers the purpose.

Should the ear show a discharge before paracentesis of the ear drums is performed, frequent irrigations with warm boric acid solution should be practiced.

Paracentesis may be required to allow the escape of secretions. It can be done under local or general anesthesia. The carbolic acid solution in glycerin works best, as cocain has no action through an unbroken skin. The cut should be made in the lower part of the drum in a semilunar manner following the curve of its border. A simple puncture is usually valueless.

Cerumen and foreign bodies must frequently be removed from the external auditory canal. If they are not lodged behind the isthmus this is comparatively easy, but if in this situation great care must be exercised in their extraction.

The best way to remove cerumen is to dissolve it by instilling a solution of bicarbonate of soda plus a little glycerin or by dropping peroxid of hydrogen into the ear and then gently irrigating it away.

Foreign bodies in front of the isthmus may readily be extracted by forceps, but when behind this they are hard to grasp without danger of injuring the drum. Besides the suction produced on withdrawing a snug fitting object may be sufficient to rupture the drum. Therefore, if possible, work a curved, fine canula behind the object; this answers the double purpose of allowing air to enter between the drum and the obstruction and permits of the necessary manipulations to prevent the object being pushed further in, while attempting to grasp it by forceps. Sometimes a lubricant permits the object to slide out more readily, and occasionally the injection of adrenalin cocain solution will shrink up the soft parts

so as to make removal possible. As a last resort an operation must be undertaken.

When a foreign body is apt to swell up if soaked in water, aqueous irrigating fluids are contra-indicated.

E. Minor Genito-urinary Ailments

(*See also Genito-urinary Diseases, Section X*)

Menstrual Disorders.—Menstrual disorders are usually classed under four heads: *amenorrhea, menorrhagia, metrorrhagia* and *dysmenorrhea.*

Absence of the Menstrual Flow.—Absence of the menstrual flow, aside from the physiological causes of immaturity, pregnancy, and the menopause, may be due to the condition known as infantilism, change of habitat, nervous shocks, debility, or loss of ovarian substance. A pseudo form occurs when the menstrual fluid is retained—due to atresia of the vagina or cervix.

The treatment resolves itself into surgical procedures for the relief of mechanical conditions, tonics, and hygienic measures for the weak and undeveloped and management of environmental and nervous conditions when they are a factor. In mild cases of underdevelopment bring the blood to the parts by hot vaginal douches, sitz baths, and the use of ovarian extract internally to establish the flow. In acute suppression from shock or exposure, rest, hot foot baths, catharsis and the induction of sweating will usually bring the desired results.

Excessive Menstrual Flow or Intermenstrual Bleeding.—This may be laid to one of three kinds of causes, *i.e.,* something that raises or keeps up pelvic congestion beyond physiological limits—as for instance valvular heart disease, a weakened condition of the blood vessels in the endometrium, or some abnormality of the blood itself.

An active hyperemia is best treated by counterirritation or cold applied over the lower part of the abdomen or else by a full hot bath, together with any other diaphoretic measures necessary to bring a large volume of the circulating blood to the surface of the body.

Then there are the passive congestions due to abnormalities in the vascular system generally. Cardiac stimulants, treatment of nephritic conditions, removal of dropsical fluids, relief from portal congestion, are a few of the underlying indications readily called to mind. Local obstructions, such as tumors or exudates, may act in the same way as the aforenamed general factors to create a passive congestion in the endometrium, and must receive appropriate treatment (Cancer of the Uterus, Section V).

Disease of the blood vessels of the endometrium may be a local disorder or simply reflect a condition found everywhere. The prognosis in the

latter case is not good and in severe cases a hysterectomy may be the only means of cure, particularly after the menopause has been reached.

A less radical measure is a very thorough curettage which completely destroys the endometrium, and the use of so-called uterine and general tonics:

℞ Ex. ergot. fl. .....
Ex. hydrastis. fl. ..... āā ʒiv āā 15,0
Tr. cinchon. co. .....
Glycerin .....
M. S. One teaspoonful two or three times a day.

A Deficient Clotting Power in the Blood.—This may at times be remedied by the use of simple tonics—especially those containing iron in some form; but more often a quicker result can be obtained by the injection of horse serum in 20 c.c. doses once or twice.

Painful Menstruation.—Painful menstruation has many different phases, according to the relative time at which the pain reaches its height and the seat of the pain. *Premenstrual pain* is usually due to some ovarian trouble, an especial type of which needing particular mention is that due to a thickened tunica albuginea, occurring frequently in spinsters, and for which marriage or surgery seems to offer the only relief. *Pain during menstruation* is most often caused by a retention of the menstrual fluid in the uterine cavity and is relieved by facilitating the flow and overcoming the spasm—hot sitz baths, chloral hydrate, suppositories of opium and belladonna.

℞ Extr. belladonn. ..... āā gr. 3 0,2
Extr. opii .....
Butyr. cacao ..... ʒi 4,0
M. ft. suppos. vi. S. Insert into rectum twice a day.

Leukorrhea.—Leukorrhea is the expression of a catarrhal condition of the female genital tract and may vary from a thick semipurulent discharge to a thin watery fluid. General impairment of health and inflammatory conditions, especially about the cervix, are the chief factors.

Treatment.—General tonics and locally astringent douches and applications form the basis of treatment. Granulations about the cervix should be curetted away and if the cervix is edematous multiple punctures are indicated. Painting the cervix with tincture of iodin is also efficacious. Glycerin tampons are indicated if depleting measures are necessary. Odors can be removed by douches of lysol (one-half per cent strength) or potassium permanganate (one to one thousand). Gonorrheal discharges are discussed elsewhere.

Pruritis vulvae.—This annoying condition may be due to general auto-intoxication with local erythematous conditions, the irritation arising from discharges, pediculi, or worms, and the action of diabetic or hyperacid urine, etc. Senile changes in the skin are also occasionally the cause of marked itching.

Treatment.—The treatment consists of bowel regulation and attention to underlying constitutional causes, such as gout, diabetes, etc., local cleansing, sedative applications, after the removal of any irritating factor. Pediculi can be exterminated by the use of blue ointment and worms, which have migrated to the vagina, by antiseptic douches. The following prescription will render the urine bland:

℞	Potass. acetat.	ʒi	30,0
	Potass. et sod. tartrat.	ʒii	60,0
	Sod. bicarb.	ʒi	30,0
	Aq.	ʒviii	240,0

M. S. One tablespoonful in water three times a day.

Local treatment for pruritis is most important. The parts should be washed several times a day with warm soda water followed by a two per cent carbolic acid solution. If an examination with a magnifying glass reveals fissures or breaks in the skin or mucosa, cauterization with a five per cent argentic nitrate solution three times a week is indicated. The following ointments are useful:

℞	Camphor ice	ʒi	30,0
	Acid carbolic	ʒss	2,0
	Cocain	gr. x	0,6

M.

℞	Vaselin	ʒi	30,0
	Ichthyol	ʒi	4,0
	Cocain	gr. x	0,6

M.

℞	Vaselin	ʒi	30,0
	Menthol	ʒss	2,0
	Bismuth subcarb.	ʒi	4,0

M.

The dusting powders for pruritis are: stearate of zinc with acetanilid, powdered starch, and powdered talcum.

If itching does not stop after giving the above medicaments a reasonable trial, we may employ orthoform, chloral, resorcin, alcohol, vinegar, chloroform, tincture of iodin, adrenalin, hot-water, refrigeration, traumaticin, collodion.

The surgical treatment is by resection of the genitocrural, ilio-inguinal, inferior pudendal, and superficial perineal nerves.

In senile pruritis the application of the x-ray often effects a cure. There is a type of pruritis affecting the scrotal region which is due to venous engorgement and is relieved by a light suspensory bandage.

Incontinence of Urine.—Bed-wetting may be due to lack of training, to loss of the control function of the central nervous system, to reflex irritation from local conditions, and to an irritating urine, etc. Bed-wetting is common in children with a neuropathic constitution.

Treatment.—Children's night drawers should be loose around the buttocks. Fluid before bedtime should be restricted to the quenching of thirst. The foot end of the bed may be raised, so that the urine will gravitate to the fundus of the bladder. Adenoids, large tonsils, elongated prepuce, and phimosis should be attended to. An enema before bedtime is advisable.

In the way of medication—iron, arsenic, phosphorus, and the bromids are indicated. Sponging with cold water in a warm room is a neuro-vascular tonic.

Internal medication for bed-wetting should not be pushed to the point of interfering with digestion. The following formulae are useful:

℞ Sodii bromid ..... ℥iii 12,0
Ex. ergot fl. ..... ℥iii 12,0
Tr. belladon. ..... ℥iii 12,0
Aq. cinnamomi .....ad ℥iv ad 120,0
M. S. One teaspoonful at bedtime.

℞ Potass. citrat. ..... ℥ii 8,0
Spir. etheris nitrosi ..... ℥ii 8,0
Aq. destil. ..... ℥iii 90,0
M. S. Two teaspoonfuls dil. three times a day.

When the central nervous system is at fault it may be from weakness or hypertonicity. In the first case tonics are in order, while in the latter bromids.

Some of the following prescriptions are well recommended:

℞ Liq. potass. arsenitis ..... ℥ss 2,0
Tr. nucis vomicae..... ℥ss 2,0
Aq. destillat. ..... ℥iii 90,0
M. S. One teaspoonful after meals three times daily.

℞ Strychnin. sulph. ..... gr. ½ 0,03
Ac. phosphor. dil. ..... ℥i 30,0
Fl. ext. cocae ..... ℥iii 90,0
M. S. One-half teaspoonful three times a day after eating.

A catarrh of the neck of the bladder in women, or the dragging of a misplaced uterus, or a severe fit of coughing frequently causes incontinence. The treatment is that of the underlying condition. Uterine displacements must be corrected. Tenesmus can be cured by the introduction of graded sounds. The dribble from an overfilled paralyzed bladder may simulate the true condition (*see also* Section X).

Scalding Urine.—Pain or burning on micturition is sometimes observed after inhaling turpentine vapor and after drinking a decoction of balsamics and pine needles—often used as a home remedy. It subsides in a short time without treatment or after drinking hot milk and vichy water.

If this annoying symptom persists a local examination in addition to the urine examination is in order.

To Allay Chordee and Sexual Excitability.—

℞ Fld. ext. ergot	gtt. xv	1,0
Tinct. gelsemii	m v	0,3
Potass. bromid	gr. xx	1,3
Tinct. hyoscyami	ʒss	2,0
Syr. aurantii q. s. ad	℥ss	ad 15,0

M. S. To be taken at bedtime (one dose).

F. Minor Ailments of the Skin and Appendages

Dermatitis and Eczema.—Dermatitis and eczema may be considered together for the purpose of treatment. They represent inflammatory affections of the skin induced in the first case by extraneous influences, and in the second place by nature's effort to eliminate some autotoxic substance by way of the skin or as a result of anaphylactic action.

The picture may progress to any stage of a cycle comprising erythema, vesicularization, papule formation, pustular conditions, induration, and desquamation. The main subjective symptom is itching.

Treatment.—The *constitutional treatment* consists in opening all of the emunctory organs, so as to relieve the skin as much as possible from this function; restricting the diet to those articles not easily inducing putrefactive changes in the intestines; and keeping the patient in fresh air as much as feasible.

The *local treatment* consists of sedatives, salves, and lotions during the erythematous stage; drying powders when vesicularization has set in; antiseptic washes in purulent conditions; stimulants for indurated areas; and oily preparations to remove scales.

The following medicaments will be found useful in the various forms of dermatitis and eczema of nonluetic origin:

℞	Ol. amygdal. dulcis	ʒi	30,0
	Milk of magnesia	ʒiii	90,0

M. S. Use for cleansing affected area instead of water.

℞	Ol. cadini	ʒiv	15,0
	Glycerin.	ʒi	4,0
	Ung. diachyl.	ʒiiss	75,0

M. S. Apply locally.

Lassar's Paste:

℞	Acid. salicylic.	ʒss	2,0
	Pulv. amyli.	ʒi	4,0
	Ungt. zinci	ʒi	30,0

M. S. For external use.

℞	Bismuth. subcarb.	ʒi	4,0
	Zinci oxydat.	ʒi	4,0
	Lanolin.	ʒi	30,0
	Ichthyol.	ʒi	4,0

M. S. Salve.

Tar or Peru Balsam can be incorporated into this salve instead of ichthyol:

℞	Acid. salicylic.	ʒss	2,0
	Zinc. oxidat.	ʒiii	12,0
	Pulv. amyli.	ʒv	20,0

M. S. Use as dusting powder.

A Bland and Harmless Dusting Powder:

℞	Cornstarch	ʒix	36,0
	Powd. talc	ʒi	4,0
	Oil rose	gtt. ii	0,12
	Acid boracic	ʒss	2,0

M. Use freely as occasion requires.

Stearate of zinc with or without acetanilid is an excellent dusting powder for *dermatitis, intertrigo,* and *mild eczema.*

Beef or mutton suet (salt free) or lanolin are non-irritating, and make an excellent dressing for some forms of eczema.

Jackson's Lotion for Eczema:

℞	Acid carbolic	ʒi	4,0
	Calamin	gr. xx	1,3
	Zinci oxid.	ʒss	2,0
	Glycerin	ʒii	8,0
	Aqua calcis.	ʒvi	24,0
	Aqua rosae	ad ʒiv	ad 120,0

M. S. Apply night and morning.

Lead Lotion:

℞	Lig. plumbi subacet.	ʒi	30,0
	Aquae	pt. 1	500,0

M. S. Apply on lint. One dram of laudanum can be added to this lotion if desired.

For Sore Nipple:

℞	Balsam Peru Tinct. arnicae	āā gtt. xxx	āā 2,0
	Ol. amyg. expr. Aqua calcis.	āā ʒiv	āā15,0

M. S. Apply with a camel's hair brush.

For fissured hands:

℞	Acidi tannici	gr. viiss	0,5
	Glycerini	ʒi	30,0
	Aquae rosae	ʒiiiss	100,0

M. S. Rub well over hands morning and evening. Before retiring use lanolin.

Acne (*Pimples*).—Acne is an inflammation of the sebaceous glands going on to abscess formation. It usually occurs in people whose skin has become vulnerable by reason of some low grade general toxemia and anemia.

Treatment.—The treatment is local and constitutional. If due to blackheads, I usually direct my patients to steam their faces every night with several hot towels and then to pinch up the skin between the fingers—avoiding the use of the nails—and squeeze out as many of the comedones as readily yield. The next direction is to wipe off the face with a weak alcoholic solution (say, forty per cent strength) or else use an extract of witch hazel or Florida water.

Hygienic living, bowel regulation and warm baths will aid nature in warding off the tendency to acne formation.

The following application may be made over night:

℞ Kaolin ..... ℥iss 45,0
Glycerin ..... ℥i 30,0
Vinegar ..... ℥v 20,0
M. S. Paste for acne. Apply over night.

℞ Lac. sulphur .....
Glycerin ..... āā ℥i āā30,0
Alcohol .....
Ol. rosae ..... gtt. 3 0,2
M. S. Apply at night; wash off in the morning.

When the lesions are large, discrete, and deeply located in the tissues, the best result will be obtained by painting the tubercles with tincture of iodin. Reports are favorable as to the effect of x-rays on these cases also.

Autogenous vaccines are employed with success in obstinate cases. Deep seated abscesses require opening and surgical dressing.

Boils.—*See* Furunculosis.

Pediculi (*Lice*).—Pediculi occur under varying conditions in three distinct locations: the scalp, the clothing, and the pubic region.

The HEAD LOUSE is easily killed by antiseptic solutions, but the "nits" which are attached to the hairs are very resistant. A delphinium cap made by soaking a towel in the tincture of delphinium and wrapping it around the head will usually destroy the louse. By first applying a three per cent acetic acid solution or vinegar (diluted one-half), the capsules are softened and the drug acts more quickly. Ordinary petroleum oil (kerosene) will also kill pediculi.

The BODY LOUSE dwells in the clothing and is only found on the skin when feeding; therefore the best procedure is to wash and boil or steam the clothing.

The CRAB LOUSE is best destroyed by the officinal blue ointment. The secondary dermatitis caused by the pediculi and the scratching should be treated in the usual manner.

Scabies.—Scabies is the disease produced by the irritation furnished by the Acarus scabei, or itch-mite, which burrows in the skin.

Treatment.—The treatment consists in taking a thorough bath every night, applying an antiseptic salve, and sleeping under and wearing fresh linen every day.

The following salves are useful:

℞ Lac. sulphur. ..... ℥i 4,0
Betanaphthol. ..... ℥ss 2,0
Petrolat. ..... ℥i 30,0
M. S. Apply after bath.

℞ Lac. sulph. ..... ʒi 4,0
Balsam. Peru. ..... ʒss 2,0
Adipis ..... ℥i 30,0
M. S. Apply after bath.

Ringworm.—Ringworm is a parasitic invasion of the skin. The primary lesion is a papule, and the ring is formed by a group of these.

Treatment.—The condition can readily be cured by cleanliness and by painting the patch with tincture of iodin and subsequently applying an ointment or lotion as follows:

℞ Lac. Sulph. ..... ʒi 4,0
Ac. boric. ..... ʒi 4,0
Petrolat. ..... ℥i 30,0
M. S. Apply twice daily.

℞ Sod. hyposulph. ..... ʒi 4,0
Aquae ..... ℥i 30,0
M. S. Apply locally.

For ringworm of the scalp the following is recommended:

℞ Chrysarobin ..... ʒi 4,0
Ichthyol ..... ʒss 2,0
Acid. salicylic ..... ʒss 2,0
Petrolatum ..... ℥iii 90,0
M. S. Rub in well for two days and follow with a soothing application.

Paronychia.—Paronychia is an infection of the nail-bed. It may also be a manifestation of syphilis, when specific treatment must be instituted.

Treatment.—A very effective application is the following:

℞ Argenti nitratis ..... gr. xv 1,0
Sp. etheris nit. ..... ℥i 30,0
M. S. Paint about the nails once a day.

In case of non-success by ordinary methods the inflammatory focus can be exposed by pushing back the cuticle (after loosening it up by keeping the finger submerged in a warm antiseptic solution). When the rear of the nail is reached it will usually be found loose, and can be hooked up and cut away from edge to edge. This gives vent to secretions, and bathing in a hot antiseptic solution and applying a moist dressing is all the after treatment necessary.

Callosities.—For callosities the following is said to be efficient:

℞ Resorcin ..... } āā gr. xv āā 1,0
Salicylic acid ..... }
Lactic acid ..... } āā ℥iiss āā 10,0
Flexible collodion ..... }

M. S. Apply daily for five or six days; then after a foot bath employ friction over the callous part and pick off the collodion with the loosened callous skin.

Felon or Whitlow.—Wear a gauze dressing moistened with a saturated solution of magnesium sulphate and glycerin (equal parts). Remove the dressing daily and bathe the finger for half an hour in hot borax water.

If resolution does not take place the knife is indicated.

Burns.—Burns of the first and second degrees are treated in three general ways: The first is by oily preparations to which some analgesic may be added; the second is by dry dressings; the third is the open method.

When there are vesicles or raw surfaces the dry dressing is best, unless there is also infection—when the moist antiseptic dressings are indicated. The oily preparations are most indicated in the erythematous type.

℞ Ac. carbol. ..... gtt. x 0,6
Vaselin. ..... ℥ii 60,0

M. S. Apply to raw parts of burn.

℞ Ol. lini ..... ℥iv 120,0
Aq. calcis ..... ℥iv 120,0
Ac. carbol. ..... ℥ss 2,0

℞ Olive oil ..... ℥x 40,0
Yolk of ..... 4 eggs
Carbolic acid ..... gtt. x 0,6

A very soothing and efficient application in burns of the first degree.

With burns produced by chemical agents, the natural correctant should be applied if seen early enough, as, for instance, a weak alkaline solution to neutralize an acid, or vice versa. Also remember that alcohol will neutralize carbolic acid.

For a dry dressing we make use of equal parts of bismuth subnitrate, oxid of zinc, and powdered starch. This is dusted thickly on the burn and covered with gauze and dry cotton.

The *open method* attempts to prevent the multiplication of the organisms of putrefaction by dusting the surface with boric acid without dry protecting dressing.

Constitutional treatment consists of morphin for pain, stimulants and

suprarenal preparations for shock, and high caloric irrigation with hot saline at 110° F. and saline laxatives to aid elimination.

Varicose Ulcer of the Leg.—This is a common affection. The condition of the veins usually impairs the health of the skin, so that there is more or less of a diffuse eczema present. The ulcer proper generally has its inception with the rupture of a small vein and progresses because of the poor recuperative power of the skin.

Treatment.—Before attempting to heal or close an ulcer the skin adjacent must be rendered as healthy as possible. To do this clean away all thick scales with olive oil, wash with a one to five thousand bichlorid of mercury solution, and then treat with one of the preparations indicated under the heading of Eczema. The bed of the ulcer can be stimulated into a granulating surface by the application of silver nitrate solution in from two to ten per cent strength.

After the tissues have begun to take on a more active, healthy appearance, there are several courses which may be pursued. The simplest is to paint the ulcer with collodium iodatum to form a protective shield, and firmly bandage the leg. This treatment should be repeated every third or fourth day. Another method is to coat the leg with the following paste, except for the ulcer and immediate borders:

℞ Zinc oxid ..... 4 parts
Gelatin. pur. .....4 "
Glycerin. .....16 "
Aq. destil. .....16 "
M.

After the paste has set, treat the ulcer proper with the iodized collodion, tincture of iodin, silver nitrate, or a drying antiseptic powder, and apply a firm bandage. At times it is necessary to remove the superficial veins before healing can be effected. During the treatment for ulcer the leg should be elevated or encased in an elastic bandage.

Warts.—Warts are benign papillomata of the skin. Their removal can be accomplished by the application of nitric or glacial acetic acid on the point of a toothpick—care being taken that the adjacent skin is protected. Cinnamon oil applied to warts will often effect a cure. Bathing the hand twice a day for ten minutes in hot sea water or water containing sea salt (one ounce to the pint) is said to cure warts and corns in two weeks.

There are many pastes which set up a reaction sufficiently pronounced to remove the growth by desquamation. Some of these are appended:

℞ Chloral. hydrat. .....gr. xv 1,0
Ac. salicyl. 3i 4,0
Etheris 3i 4,0
Collodii 3iv 15,0
M. S. Paint on wart once a day.

℞ Ex. cannabis indic. ..... gr. xv 1,0
Ac. salicyl. ..... ʒss 2,0
Collodii ..... ʒi 30,0
M. S. Paint on wart once a day.

℞ Hydrarg. chlorid. corrosiv. ..... gr. v 0,3
Acid salicyl. ..... ʒi 4,0
Collodion ..... ʒi 30,0
S. Apply once a day, the crust formed by the previous layer being first removed. If necessary the mercurial salt may be increased up to 30 grains.

With large warts these methods fail or are too tedious and excision or curettement, followed by a treatment of the base with styptics, yields the best results.

Corns.—Corns are hyperplastic growths of epithelium, are situated between the toes or on the exposed surfaces of joints and have a central core growing downward into the subjacent tissues. The "soft" corn is produced by a maceration of the tissues caused by the action of moisture, and usually occurs between the toes.

Treatment.—Soaking in hot sea or salt water to soften the superficial layers and then touching up the base with the silver nitrate stick gives most relief. The salicylated collodion (Squibb's) makes a good application for the removal of corns. It is applied after soaking the feet in hot water and renewed every night for a week. On the removal of the scale thus formed the corn usually comes away too, or can be easily picked out.

Should a formula be required for a salicylated collodion the following will be found satisfactory:

℞ Ac. salicyl. ..... gr. xxv 1,6
Ex. cannabis indic. ..... gr. viii 0,5
Alcohol. ..... gtt. xv 1,0
Aether. ..... ℈ ii 2,6
Collod. flex. ..... ʒiss 6,0
M. S. Apply to corn after bathing foot in hot water.

℞ Resorcini ..... } āā gr. xv āā 1,0
Acidi salicylici ..... }
Acidi lactici ..... } āā ʒiiss āā 10,0
Collodii flex. ..... }
M. S. To be applied for five or six days in succession.

The foot is then well soaked in hot water, and the collodion lifted off bringing the corn away with it.

Bed Sores.—Bed sores develop as pressure sores in debilitated patients. They should be prevented, if possible, by keeping off pressure and washing the skin with alcohol.

After they have been formed they may be dressed with Horner's Ointment, which is made up of equal parts of zinc oxid, alcohol, and castor oil.

Superfluous Hair.—The removal of hair can only be successfully accomplished by the electric needle. There are many pastes which will remove the surface hair but care must be exercised not to irritate the skin by their use. Some formulae are appended:

℞ Stront. sulphid. ..... ℥ii 8,0
Zinc oxid ..... } āā ℥iii 12,0
Amyli ..... }
M. S. Mix sufficient powder and water to make a paste, as required, and apply from one to five minutes. Soap off and apply cold cream.

℞ Barium sulphid. ..... ℥i 4,0
Zinc oxid ..... } āā ℥iii 12,0
Amyli ..... }
M. S. Make into a paste with water and apply for five to ten minutes.

Martin's Depilatory:[1]

A soft mass, containing calcium hydrosulphid, Ca_2HS, is prepared from 2 parts of slaked lime and 3 of water by passing hydrogen sulphid into the mixture as long as it is absorbed. The mass has a strong sulphurous odor, and, on standing, separates into two portions, which are to be mixed when used; if properly prepared, an application for eight or ten minutes is sufficient for removing the hair.

Alopecia (praematura, syphilitica, pityroides).—In ALOPECIA PRAEMATURA IDIOPATHICA much can be done to prevent baldness. In the absence of local scalp disease the maintenance of vigorous health is all important. Massage of the scalp must be practiced at least three times a week with cold cream as an emollient. The hair must be thoroughly brushed twice a day and the following preparations may be rubbed into the scalp twice a day:

Hair Tonic:

℞ Pilocarpin. mur. ..... gr. xxv 1,6
Alcoholis ..... ℥ii 60,0
Aq. rosae ..... ℥ii 60,0
Aq. coloniensis ..... ℥ii 60,0
M.

[1] National Dispensatory.

Hair Tonic:

℞ Tinct. cinchon. co.
Tinct. gallar.
Tinct. cantharid.
Aq. coloniensis } āā ʒii 8,0
Glycerini ʒi 30,0
Aquae
Spir. vini } āā ʒiii 90,0
M. S.

Hair Lotion:

℞ Acid acetic ʒiv 15,0
Pulv. boracis ʒi 4,0
Glycerin ʒiii 12,0
Alcohol. ʒiv 15,0
Aq. rosae ad ʒviii ad 240,0
M. S.

Shampoo:

℞ Tinct. sapon. virid. ʒii 60,0
Potass. carbon. ʒi 4,0
Aquae 1 pint 500,0
Spir. lavandul. ʒi 4,0
M. S. Shampoo.

In ALOPECIA PITYROIDES the scalp may be cleansed of its dandruff by rubbing in the following lotion and using a fine tooth comb to comb out the débris:

Dandruff Lotion:

℞ Potass. carbon.
Ammon. carbon. } āā ʒss āā 2,0
Glycerini ʒiv 15,0
Aquae
Spir. vini } āā ʒviii āā 240,0
Ol. lavandul. gtt. vi gtt. vi
M. S. Apply once a day.

Subsequently a pomatum of white vaselin with either resorcin, tar, or mercury incorporated, should be rubbed in over night.

Shampoo Jelly:

℞ Sapon. (Castile) ..... ℥iv 120,0
Potass. carbonat. ..... ℥iv 15,0
Aquae ..... ℥vi 180,0
Glycerin. ..... ℥ii 60,0
Ol. lavandulae ..... gtt. v 0,3
Ol. bergamot. ..... gtt. x 0,6

M. S. Shave the soap to ribbons; melt with water over a water bath; add the potassium carbonate; and allow to cool. Stir in the remaining ingredients, adding more water if necessary.

Frostbites.—*See* Frostbitten Ear.

The Hives (*Urticaria*).—This is an ephemeral eruption of pinkish wheals which usually itch considerably. Intestinal auto-intoxication seems to be the most frequent cause, also food idiosyncrasy or anaphylaxis.

The bowels should therefore be thoroughly cleaned out, and then any of the following applications can be made locally:

℞ Chloroform. ..... ℥i 4,0
Ung. zinc. oxid. ..... ℥ii 60,0

M. S. Apply locally.

℞ Ac. benzoic. ..... gr. x 0,6
Alcohol. ..... ℥i 30,0

M. S. Apply locally.

A bland diet and a few drops of dilute muriatic acid in water after eating is all the treatment necessary. Food idiosyncrasy is detected by the scratch test. (*See* Section I.)

Ivy Poisoning.—For ivy poisoning the following are recommended:

℞ Sod. sulphitis ..... ℥i 4,0
Glycerini ..... ℥i 30,0
Aq. camphorae ..... ℥iv 120,0

M. S. Apply locally.

also lime water, lead water, boric acid water (2 per cent), carbolic acid water (½ per cent), dusting with flour.

Nettle Rash.—

℞ Pulv. sulphur. ..... ℥i 4,0
Pulv. camphorae ..... gr. xv 1,0
Resorcin. ..... gr. xv 1,0
Ungt. zinci ..... ℥ii 60,0

M. S. Apply to the skin two or three times a day.

Freckles (*Lentigo*).—This is a condition of small circumscribed, multiple areas of increased pigmentation in the skin, usually developed by the action of the sun. The condition can be improved by the following preparations but it will recur with a fresh exposure. Very dark disfiguring spots can be touched with pure carbolic acid and then alcohol.

Freckle Remedies:

℞ Hydrarg. chlor. corros. ..... gr. iii 0,2
Ac. hydrochlor. dil. ..... ℥i 4,0
Alcoholis ..... ℥i 30,0
Glycerin ..... ℥iv 15,0
Aq. rosae ..... ad ℥iv ad 120,0
M. S. Apply at night and wash away in the morning.

℞ Chloral hydrate ..... ℥ii 8,0
Carbolic acid ..... } āā ℥i āā 4,0
Tr. iodin ..... }
Glycerin ..... ℥i 30,0
Mix and dissolve. S. Apply with a camel's hair pencil at night, on freckles only.

Formulae for Other Diverse Skin Blemishes.—

HAND LOTION

℞ Tr. lavandulae co. ..... ℥iii 12,0
Ac. citrici ..... gr. x 0,6
Alcoholis ..... ℥i 30,0
Aquae ..... ℥i 30,0
Glycerin ..... ad ℥iv ad 120,0
M. S. Hand lotion.

ASTRINGENT WASH FOR FLABBY SKIN

℞ Expressed juice of cucumbers ..... ℥iss 45,0
Tr. benzoin ..... ℥ss 15,0
Cologne water ..... ℥i 30,0
Elder flower water ..... ℥v 150,0
M. Put the tr. benzoin in an eight ounce bottle, add the other ingredients, previously mixed, shake slightly and strain through cheese cloth. This is said to be quite effective in the treatment of coarse pores, and to remedy an oily and flabby skin. Apply with sponge night and morning.

SUNBURN REMEDY

℞ Borax ..... ℥ii 8,0
Chlorate potash ..... ℥i 4,0
Alcohol ..... ℥ii 8,0
Glycerin ..... ℥v 20,0
Rose water ..... ad ℥vi ad 180,0
M. Dissolve the potash and borax in the rose water and then add alcohol and glycerin. Bathe the face as required.

TAN LOTION

℞ Bichlorid of mercury ..... gr. iii 0,2
Distilled water ..... ℥vii 210,0
Glycerin ..... ℥ss 15,0
M. Dissolve the mercury in the water, then add the glycerin. S. Apply with a soft sponge as often as agreeable.

BLEACHING SKIN CREAM

℞ Lanolin ..... ℥i 30,0
Bitter oil almonds ..... gtt. xx 1,3
Mix and stir with this salve base a solution of
Borax ..... gr. ii 0,12
Glycerin ..... ℥ss 2,0
Hydrogen peroxid ..... ℥ss 2,0
S. Apply often, washing and thoroughly cleansing the skin daily.

HAND AND TOILET LOTION

Harbold[1] offers the following as a "non-sticky, non-greasy, and non-irritating," soothing lotion:

℞ Tragacanth ..... ℥ss 2,0
Cydoniae seminis ..... ℥iv 15,0
Sodii boratis ..... ℥iss 6,0
Acidi borici ..... ℥ii 8,0
Sodii benzoatis ..... gr. xlv 3,0
Glycerini ..... } āā fl℥iiss āā 75,0
Alcoholis. ..... }
Aquae bullientis ..... fl℥xx 600,0
Aquae ..... ad Oii ad 1000,0
M. S. A soothing and mildly antiseptic lotion.

It is not necessary to shake this mixture. Any perfume or coloring desired may be added to this lotion.

[1] *Druggists' Circular*, Nov., 1907.

Harbold directs:

Dissolve the tragacanth in one-half a pint of water, stirring until it dissolves or becomes a homogeneous mixture. Steep the quince-seed in boiling water for four hours, stirring frequently; then strain carefully. Dissolve the borax, sodium benzoate, and boric acid in the remainder of the hot water. Add the glycerin, dissolved in the alcohol, and finally the tragacanth and quince-seed mucilage, which has previously been mixed, portion by portion, shaking on each addition, in order to get a thoroughly homogeneous mixture. The consistency may be varied by the addition of water.

FOR REMOVING BLACKHEADS

℞	Precipitated sulphur	ʒi	4,0
	Green soap	ʒi	4,0
	Precipitated chalk	ʒiss	6,0
	Zinc ointment	ʒi	30,0

Keep the skin well covered with this during the night and most of the blackheads may be washed out in the morning.

Another paste, which has been used with good results, has the following composition:

℞	Kaolin	4 parts
	Glycerin	3 "
	Acetic acid	2 "

ANTISEPTIC FLEXIBLE COLLODION

John T. Harbold [1] recommends the following collodion as an improvement on the flexible collodion of the Pharmacopeia:

℞	Pyroxylini (gun cotton)	ʒiiss	10,0
	Aetheris	fl ʒvi	180,0
	Tincturae benzoini	fl ʒv	20,0
	Hydrargyri chloridi corrosivi	gr. ii	0,12
	Alcoholis	ad fl ʒviii	ad 240,0

M. S. Flexible antiseptic collodion.

The following are his instructions:

Dissolve the gun cotton in the ether, shaking until it becomes of the consistency of paper pulp; then add the tincture of benzoin and shake the mixture thoroughly. To this mixture add the alcohol in which the mercuric chlorid has been previously dissolved.

[1] *Druggists, Circular*, Nov., 1907.

Formulae for Diverse Foot Ailments.—

SWEATING FEET

℞ Formalin .....
Thymol ..... āā gr. iss āā 0,09
Zinci oxid. ..... ʒi 30,0
Pulv. amyli. ..... ʒiiss 75,0
M. S. Use as a dusting powder.

OFFENSIVE SMELLING FEET

℞ Sodii bichrom. .....
Acid sulphuric ..... āā ʒi 4,0
Aquae ..... ad ʒiv ad 120,0
M. S. Put a tablespoonful in a basin of water and soak feet fifteen minutes twice a week and let solution dry on feet.

EXCELLENT FOOT POWDER

℞ Salicylic acid ..... ʒvi 24,0
Boric acid ..... ʒiii 90,0
Powdered elmbark ..... ʒi 30,0
Powd. orris root ..... ʒi 30,0
Talcum ..... ʒxxxvi 1120,0

G. Minor Ailments of the Nervous System

(*See also Section XII on Nervous Derangements*)

Headaches.—Headaches can be classified and treated under several main divisions, such as congestive, toxic, anemic, reflex, and organic.

There are as many causes for headaches as there are causes for back aches. Headaches accompany acute and chronic infections; brain disease, sinus disease, nasal obstruction, and eye strain; circulatory and excretory derangements, gastro-intestinal and pelvic disorders, blood conditions, etc. Neurotic individuals are prone to have headaches from fatigue, hunger or overeating. Syphilis, malaria, tuberculosis, chronic Bright's disease, etc., frequently have headaches as a symptom. Some toxins have a selective affinity for certain nerves and headaches may be the expression of such toxic action. A fleeting headache may not be an important symptom, but a steady persistent headache necessitates a careful clinical search for the cause.

Symptomatic Treatment.—All forms benefit by rest and the protection

of the eyes from the strong light. The congestive type, active or passive, is relieved by cooling applications to the head and warm foot baths which alter the circulation. *Catharsis* forms another method of depletion. Gastro-intestinal derangements with a coated tongue require a brisk cathartic and ten drops of diluted nitromuriatic acid in water after eating; also the diet should be light.

Luetic headaches respond to antiluetic treatment.

Malarial headaches respond to quinin.

Bromo caffein, bromo seltzer, phenacetin, acetanilid, bromid of sodium, chloral hydrate, bromural, are given symptomatically for their anti-neuralgic effects. Morphin should be given hypodermically and only in cases of intense pain. *Venesection* and *spinal* puncture may be resorted to when all else fails.

In headaches from circulatory failure (cardiovascular disease) heart drugs, digipuratum, and venesection are indicated.

In renal insufficiency diaphoretics, diuretics and cathartics, and the nitrites must be administered.

Anemic conditions call for iron and arsenic.

Migraine or sick headache is fully discussed under Nervous Derangements (Section XII).

Coccygodynia.—The name is descriptive of the condition, i. e., pain in or about the coccyx. This pain is severe, often excruciating and intensified by walking, sitting, lying on the back, and strain on defecation. Fracture, dislocation, mild arthritic changes, neuritis of the coccygeal nerves, myositis of the attached muscles, sclerotic contractions of the tendons and ligaments, bone disease and periostitis, also intestinal stasis, have all been given as causes, but many of them occur without producing the symptom and often the symptom exists without any of these conditions being present.

A clue is given to the probable etiology by the fact of its occurring most frequently in neurotic women. The condition is in reality a traumatic neurosis or a painful tic. In the first case, the injury simply served to explode the psychic element but did not remain as a persistent cause. In the second form we have usually an antecedent source of irritation which caused either a simple tenesmus of the sphincter ani, or a general contracture of the pelvic muscles. In certain individuals even after the cause is long past, the tendency to this spasm remains as a tic and anyone with much gynecological experience will have had occasion frequently to observe the tic as a quick puckering and retraction of the anal orifice on the slightest manipulation in the perineal region. This extreme hypertonicity of the muscles attached to the coccyx causes it to be subject to excessive strain and motion for which the parts are not adapted. The result is a strained and inflamed condition about the coccyx and a condition in the muscles analogous to an occupation cramp.

Treatment.—The treatment of the first group is that of psychasthenia

in general, and the more the local condition is meddled with apparently the worse it becomes. In the second variety of cases stretching of the muscles, massage and vibrations, nerve sedatives and supportive treatment generally will relieve. Removal of the coccyx frequently cures, but if the ordinary subperiosteal resection is done the muscles may have almost as good an attachment as before and the condition be unrelieved or made worse. Stretching or cutting the muscles *and destroying the innervation* up to the required degree is also a curative procedure of value. Sometimes the habit can be broken by keeping the parts in a state of continuous anesthetization for several days.

Of course these remarks do not apply to cases with acute local injuries but to those cases which come with a history of some bruise or accident in the dim past.

Neuralgia of the Rectum.—This condition must not be confused with coccygodynia. It occurs in anemic, neurotic or run-down individuals without discoverable local lesion.

Treatment.—Tonic treatment, such as an iron tropon tablet twice a day, or a sedative—such as bromural (10 grains), morning and night, will give the desired relief.

Atropia should be tried.

In severe coccygodynia a rectal suppository will give speedy relief:

℞ Extr. opii .....
Extr. belladonn. ..... āā gr. ss āā 0,03
Ichthyol. ..... gtt. i gtt. i
Butyr cacao ..... gr. x 0,6

M. ft. suppos. S. Insert into the rectum when pain is severe.

Tics and Habit Spasms—Motor Tics.—The various tics are produced, at first, by voluntary action which by repetition becomes subconscious, automatic, and only partially controllable.

Treatment.—There are two forms of treatment. In the one the patient is taught by systematic exercises more and more to control the tic; these exercises are usually carried out before a mirror. The other method is to have the patient voluntarily repeat the tic six or eight times for every time it occurs involuntarily. The idea is to again raise the actions into the domain of active, purposeful, controlled effort and so destroy the tic.

Fresh air, good food, and regular bowel action should be secured for tic patients. Drugs are not really needed.

Insomnia.—Insomnia has not been psychologically explained as yet. We know it to be associated with many conditions all having one point in common—that the cerebral circulation is disturbed. Muscular and mental relaxation are necessary for sleep, and when the opposite conditions exist, sleep is often denied.

Treatment.—Hypnotics and analgesics, while producing immediate relief, tend to ultimately increase the severity of the condition by establishing the habit of an abnormal depression as the requisite of sleep. These drugs should be reserved for cases of *severe pain* and *mental* or *nervous diseases* of a grave nature.

Hydrotherapy, gymnastics, fresh air, attention to any overloaded condition of the gastric tract, establishment of regular habits, and the elimination of worry by practical individual suggestion, are the only effective methods of treating this condition.

In insomnia and nervousness, in the absence of pain, the quiet assurance that all will be well may quiet a patient. Beer or porter at bedtime taken with a few saltine crackers may induce a quiet sleep.

The following are occasionally of great service:

Codein by mouth 0,03 (gr. ½) to 0,12 (gr. ii) for adults. Children should not have more than 1/10 of the dose for adults.

℞ Codein ..... gr. i 0,06
Urethane 5ss 2,0
} pro dosi for an adult

M.

℞ Hydrat chloral .....
Sod. bromid .....
} gr. xv to gr. xxx 1,0 to 2,0 pro dosi for an adult

M. S. Children may take 1/20 to 1/10 of above dose; it can be administered by rectum.

Trional or sulphonal is given in 1,0 doses in milk (gr. xv).

In cerebral unrest hyoscin (Merck's) is indicated—gr. 1/32 for the insane; gr. 1/100 for the sane (may be repeated).

In INSOMNIA WITH PAIN morphin hypodermically is indicated.

In INSOMNIA DUE TO MASSIVE PLEURITIC EFFUSION OR TO ASCITES withdrawal of the fluid is indicated.

INSOMNIA IN PULMONARY CONGESTION requires venesection.

Night Terrors and Day Terrors.—These are observed in excitable and neurotic children. When fear or dread attacks the child, it is morbidly dwelt upon until it has such a grip on the mentality of the young individual that a psychic storm is produced which expresses itself in the form of bad dreams or day terrors.

Treatment.—The treatment is largely educational. Try to discover the thoughts of the child and rationally explain away any fears or apprehension it may have. Bromids may be given at the commencement of the treatment. Hydrotherapy, fresh air day and night, avoiding diet errors, and attention to bowels are the principles of management.

Hysteria.—Hysteria is a psychosis in which the emotional elements are in a state of wild unrest: judgment is at fault because carried away by

the emotions; the ego is continually in the foreground and a strong tendency to imitate predominates.

Hysterical individuals lack the power to dismiss morbid impressions; for example, if they go to see a sick friend they will probably manifest the same symptoms providing the latter have been marked enough to attract their attention. However, the mimicry may not be so direct as this. A sight or object may suggest another, or one train of thought lead to another and thus the source of the particular manifestation may not be easily traced unless the patient will help the doctor.

Treatment.—A rest cure, of the Weir Mitchell variety, is the best treatment (*see* Section I).

Cut the patient off entirely from outside influences and gradually, as no new material arises to arouse these imaginative and imitative faculties, the habit weakens and is succeeded often by one of apathy. This is an ideal result because, by appropriate measures, the patient can be awakened from this to the active demands of life in an orderly and logical way.

Neurasthenia.—Neurasthenia means a weakened nervous system or one on which excessive burdens have been placed, until, like a machine that has been worn out by overwork, the assembled parts are all out of adjustment. Rest and repair are the keynotes of the treatment.

The difference between neurasthenia and hysteria is that the latter requires repression to a far greater degree than the former

Treatment.—The neurasthenic should start off with a short initial absolute rest, but after that the mind should be exercised by pleasant and non-taxing occupations. The neurasthenic usually needs rest and change from one particular kind of work to a more congenial occupation rather than a state of absolute inactivity. Tonic hydrotherapeutic measures work well on neurasthenics, and especially is change of environment beneficial. Sometimes there are accessory ailments which should receive appropriate attention.

If an incoördination of internal secretions is suspected as being responsible for neurasthenic manifestations, glandular therapy may be tried in addition to general measures.

Section XIV

Emergencies of General Practice

Synopsis: Hemorrhages. Foreign bodies. Bites (animals, snakes, insects). Antirabic treatment. Shock. Collapse. Fainting. Seasickness. Mountain sickness. Heat exhaustion. Sun stroke. Heat stroke. Lightning stroke. Electric shock. Freezing. Dyspnea. Asphyxia. Choking spells. Drowning. Pain. Colic. Ear ache. Tooth ache. Burns. Convulsions. Delirium. Urinary retention. Poisons and antidotes. Drug addiction. Alcoholism. First aid. First aid outfit.

Hemorrhages

Nose.—Epistaxis may be due to local or general causes. In about ninety per cent of cases the bleeding point is Hesselbach's triangle. This area is located at the junction of the cartilaginous and bony septum.

Local Causes.—It frequently results from trauma with or without fracture of the nasal bones, and is seen in fracture into the anterior fossa of the skull. It may be due to ulceration or tumors of the nasal passages or to chronic rhinitis.

General Causes.—Epistaxis is very common in stout, plethoric individuals, in arteriosclerosis with high blood pressure, and in hepatic cirrhosis, and is especially frequent in hemophilia. It sometimes occurs at the onset of specific fevers, especially typhoid. It often occurs about puberty without obvious cause.

Local Treatment.—The cause of the bleeding should first be ascertained. Hesselbach's triangle is easily seen by everting the nostril with the thumb and index finger. This hemorrhage may be stopped by massaging this bleeding area gently for five minutes by means of an applicator, over the end of which a piece of dry cotton has been firmly wound. Other methods of treatment are actual cautery, following the application of five per cent cocain solution, silver nitrate, and painting the area with ferric chlorid solution or thrombo-plastine (*see* Section II).

Treatment for General Causes.—When due to general causes, epistaxis may be beneficial and, unless severe, no active treatment need be under-

taken. If it does not cease with rest in the recumbent position, and a cold wet compress applied to the forehead and nose, a nasal douche of adrenalin solution (1 to 10,000) may be tried. If this fails, the nasal cavity must be packed with gauze. If anterior packing fails, the posterior nares must be plugged. This is the most effectual method. A roll of gauze of the proper size is tied round its middle with a long, double silk thread. A rubber catheter is passed along the floor of the nose into the nasopharynx and then hooked forward into the mouth by means of the fore-finger. The thread is fastened to the end of the catheter, which is then withdrawn from the nose, carrying the thread with it, and the roll of gauze is manipulated into position against the posterior nares. This should be removed in twenty-four hours.

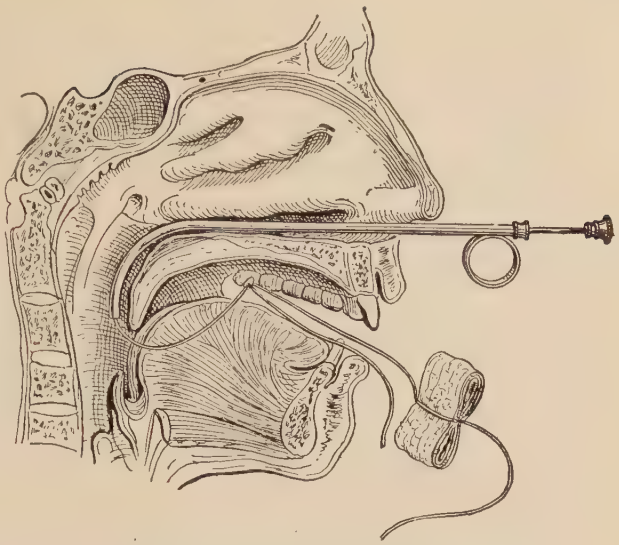


Fig. 176.—Nasal Tamponade. First Step. (After Morrow, "Diagnostic and Therapeutic Technic," published by W. B. Saunders Co., Philadelphia.)

Fig. 177.—Nasal Tampon in Situ. (After Morrow, "Diagnostic and Therapeutic Technic," published by W. B. Saunders Co., Philadelphia.)

Internally, calcium lactate in dram doses may be given. In severe recurrent cases, ten or twenty cubic centimeters of horse serum may be injected subcutaneously.

Mouth.—Hemorrhage from the oral cavity is generally due to trauma, ulceration, or extracted teeth, and is readily stopped by pressure with plain gauze or gauze soaked in adrenalin solution (1 to 10,000). *See also* section on Blood Diseases (thromboplastin as a hemostatic).

Hemoptysis and Hematemesis.—The most practical method of differentiating hemorrhage of the lungs from hemorrhage of the stomach is to have the patient rinse the blood from his mouth and then ask him to cough. If he coughs up blood, it is usually a case of hemoptysis.

Treatment.—For both conditions, the general treatment is the same. The patient must be kept absolutely quiet in bed. A hypodermic injection of morphin should be given and repeated in two hours if necessary, the object being to keep the patient absolutely quiet for two or three days. Stimulants should be avoided. For the first day the food should consist of not more than a quart of cold milk; for the second day three pints of milk with bread and butter should suffice, and after this the ordinary soft diet may be given. At the end of six days the patient may sit up.

In recurrent or severe hemorrhage twenty cubic centimeters of normal horse serum or diphtheria antitoxin should be injected subcutaneously. Dry serum in sterile bottles is now on the market under the name of *coagulose.*

A valuable substitute for horse serum is whole blood. Twenty cubic centimeters of whole blood are withdrawn from the vein of a relative by means of a common aspirating syringe, and injected intramuscularly into the patient.

Rectum.—Bleeding from the rectum is generally due to hemorrhoids and is distinguished by the bright red color of the blood. The blood from the sigmoid or colon is dark in color. In profuse bleeding from hemorrhoids the sphincter should be stretched and the rectum packed with a strip of gauze. Packing should be removed in twenty-four hours. If the hemorrhage does not cease, the case becomes surgical.

Hematuria.—Hematuria is traumatic or non-traumatic. The traumatic cases are dealt with surgically. The treatment of pathological cases depends upon the cause. It is absolutely necessary to first ascertain the source of the blood—the blood may come from the kidney, bladder, or urethra. In a general way the source can be ascertained by observing at what period of the act of urination the greater quantity of blood appears. If unconnected with micturition, or if it comes principally at the commencement, the hemorrhage is urethral; if at the end of micturition, vesical; and when there is no difference in the color of the urine throughout the act, the source is probably renal.

Urethral Hemorrhage.—If the hemorrhage comes from an enlarged prostate or follows internal urethrotomy, it can be controlled by placing a pad of folded gauze, the size of one's fist, against the perineum and fixing it firmly in place by means of a T-bandage.

If the bleeding comes from further forward in the urethra, the penis may be bandaged against a narrow finger splint placed along its ventral aspect.

Vesical Hematuria.—The common causes are stone, tumor ulcera-

tion, and prostatic enlargement. The history and a rectal examination will reveal the presence of a hypertrophied prostate. Rectal irrigations of cold water with cold packs to the perineum will often cause the bleeding to cease. If the bladder is distended with blood clots or urine, it should be washed out with a double catheter. If the urethra is impregnable, a urethrotomy should be done by a surgeon. If a stone is present, it should be detected by passing a sound, and should be removed by lithotomy or lithotrity.

In the absence of the above indications, the possibility of tumor or ulceration must be considered. In tumor, hematuria is the first and often the only symptom. It is apt to recur at varying intervals. With ulcer, pain and frequent micturition are more prominent than hematuria. Cystoscopic examination will determine the diagnosis and treatment. If ulceration is present, bladder irrigations of silver nitrate should be given. If a tumor is present and causes severe hemorrhage, it should be removed.

Renal Hematuria.—The common causes are stone and tumor; the less frequent causes are tuberculosis, nephritis, and hemophilia. It may also be due to simple congestion or varix in the kidney. The cause should first be determined, and secondly, it should be ascertained whether one or both kidneys are involved. The history of the case will often suggest the presence of a stone which may be verified by an x-ray plate. The patient should be put in bed and given a hypodermic of morphin. If a stone or tumor is present and the symptoms justify an operation, the patient should have surgical relief.

Hemorrhage from the Vagina in Pregnancy.—Hemorrhage from the vagina during pregnancy is usually due to some form of abortion. Abortion is divided, according to symptoms, into threatened and inevitable; according to degree, into complete and incomplete. In threatened abortion the patient has hemorrhage and pain; the cervix does not dilate. In inevitable abortion there are present pain, hemorrhage, and dilatation of the cervix. When the entire ovum is expelled, the abortion is complete. When a portion of the ovum is retained, the abortion is incomplete. This is the usual result after the third or fourth month.

Treatment.—In threatened abortion, look for the cause; make sure that the uterus is in the correct position. Upon the appearance of symptoms put the patient to bed; keep her quiet and cool; give morphin hypodermically to quiet uterine contractions, and keep nervous symptoms under control. After a few days substitute codein (gr. ½) every four hours, and later fluid extract of viburnum (Hayden's compound) every three to four hours.

In inevitable abortion, if the cervix is hard and the woman is losing considerable blood, pack the cervical canal and vagina; this stimulates contractions, dilates the cervix, and checks the hemorrhage. When the gauze is withdrawn at the end of twelve hours, it may contain the ovum. If

the ovum is not withdrawn in the packing at the end of twelve hours, give an anesthetic, dilate the cervix with fingers (or instruments if necessary) and empty the uterus. Contractions may be stimulated with ergot (fluid-extract), m. 30 every four hours; strychnin, gr. 1/30 every four hours; or quinin, gr. 5 every four hours.

Ruptured Varicose Veins.—This condition usually occurs in the lower extremity. All that is necessary is to lay the patient flat upon his back and to elevate the leg. When the hemorrhage has thereby been arrested, a pad of antiseptic gauze should be firmly bandaged over the ruptured vein.

Foreign Bodies

Nose.—All kinds of small objects, such as peas, pebbles, and beads lodge in the nose. A unilateral nasal discharge, in a child, always suggests the presence of a foreign body.

Treatment.—Syringing in such a way that the stream runs into the unaffected nostril and out of the affected one, may succeed in dislodging the object. If this fails, the nostril should be cocainized and the object extracted by means of forceps. If the object is small, it may be pushed back into the pharynx and expelled through the mouth.

Pharynx.—Masses of food, coins, pins, and fishbones are the more common foreign bodies which lodge in the pharynx.

Treatment.—The coins, masses of meat, or pins may be removed by opening the mouth with a gag and dislodging the foreign body with the forefinger. Fish bones as a rule pierce the mucous membrane or become entangled in the folds and fossae about the root of the tongue and upper aperture of the larynx. They may be felt with the finger or seen with the laryngoscope and extracted with forceps.

If it is impossible to distinguish the protruding point of a fish bone from the surrounding tissue, the patient should eat some stewed huckleberries, thus coloring the fish bone blue and rendering it visible.

Esophagus (*Swallowed Articles*).—The patient is usually able to locate the position at which a foreign body has been arrested in the esophagus. It is best not to use an esophageal bougie, as it usually slips past a foreign body and may do harm. Small objects may be removed with an umbrella probang. Coins can usually be extracted with the coin catcher; if high up they may be removed with the esophageal forceps; when near the cardiac end they may be pushed into the stomach and allowed to pass out through the rectum.

If articles are swallowed, as a rule, a purgative should not be given, but instead, plenty of solid food to enable the foreign body to pass without injury to the intestine.

Another method is to take a handful of absorbent cotton, pick it into

small shreds and have the patient swallow it in milk. A few hours later a laxative should be administered and the foreign body may be looked for in the stools.

Esophagoscopy is an accurate method of diagnosis and treatment but requires a specialist. Radiography, when the object is metal, is an accurate method of diagnosis. All foreign bodies lodged in the esophagus require removal at the earliest possible moment, as ulceration or perforation into the mediastinum may result. When they cannot be removed by the above methods surgical means must be adopted.

Larynx—Bronchus—Lungs.—*See* Asphyxia.

Ear.—Foreign bodies, such as beads, peas, insects, buttons and the like, are sometimes introduced into the auditory canal. The ear should always be examined under a good light and the exact position and nature of the object determined.

Treatment.—They are best removed by syringing with warm water. Oil is to be used instead of water for the removal of foreign bodies liable to swell in water. A piece of soft rubber tubing the length of a cigarette should be attached to the nozzle of a syringe and introduced into the meatus, so as to almost touch the foreign body. A strong stream of water should then be projected along the upper wall, while the canal is straightened out by pulling the auricle upwards and backwards.

Forcible aspiration with an aspiration syringe attached to the rubber tube will frequently dislodge the foreign body.

A small, loose object may be readily removed by means of a camel's hair brush, the end of which has been dipped in glue. The glue end of the brush is applied to the foreign body and allowed to dry, when both brush and object may be removed at the same time.

If these methods fail, the object should be removed by the blunt hook and forceps. If there is difficulty in keeping the patient quiet—especially children—an anesthetic should be administered. When the object is too large or too solid to be extracted by any of the above means, it may be necessary to open into the meatus from behind.

Eye.—The foreign bodies which most frequently require removal are particles of coal, ash, cinders, steel, iron and dust. Before removal, the exact location must be known. In most cases it will be found upon the cornea or upon the tarsal portion of the conjunctiva of the upper lid—rarely in the retrotarsal fold and scarcely ever in the lower cul de sac.

Treatment.—Cornea.—When the object is upon the cornea, good daylight is sufficient to disclose the object, although concentration of artificial light with a strong convex lens is far more satisfactory. When the object is known to be upon the cornea but is not visible with the convex lens, it is well to instill a drop of fluorescein solution (two per cent fluorescein and three per cent sodium bicarbonate—equal parts in water). This reagent is retained with closed lids for two minutes and then the

excess may be washed away with boric acid solution. The tiny object will be readily detected, as the adjacent abrasion of the cornea will be stained green.

Having located the foreign body upon the cornea, a few drops of two per cent solution of cocain are instilled into the eye and the object may be brushed off by means of a piece of clean blotting paper. If this method fails, it will be necessary to use a blunt foreign body spud or the blunt end of a Hagedorn needle.

Upper Lid—Tarsal and Retrotarsal Folds.—The patient must look downward; the lashes and margin of the upper lid at its center should be grasped between the right thumb and forefinger, the thumb being lowermost; the lid is drawn downwards and forwards. The end of the index finger of the left hand, or a probe, should then be placed on the external surface over the upper limit of the tarsal cartilage, pressed downwards and a little forwards, and used as a fulcrum upon which the eyelid is suddenly turned. The lid is kept everted by the thumb of the left hand, the extended fingers resting upon the patient's forehead. The retrotarsal fold is explored as follows:

While the upper lid is everted and fixed above by the surgeon's thumb, the patient is directed to look downwards and inwards, and pressure is applied on the eyeball through the lower lid, when the retrotarsal area can be made to start forward.

Lower Lid.—The patient is directed to look upwards, the lower lid is everted with the index finger and thumb of the left hand, and the object brushed away with a piece of blotting paper.

Rectum.—All kinds of foreign bodies, such as buttons, pins, and coins, are introduced into the rectum by children and the insane. Objects may traverse the entire alimentary canal and become lodged in the rectum. Their removal is urgent, as perforation into the peritoneal cavity or bladder may take place.

Treatment.—In most cases it is necessary only to stretch the sphincter, giving an anesthetic when necessary. The foreign body may be extracted by means of forceps.

Vagina.—Foreign bodies introduced into the vagina of children are readily removed by forceps, care being taken not to rupture an imperforate hymen.

Urethra.—An object introduced into the urethra or a stone descending from the bladder may become impacted and cause partial or complete obstruction to the flow of urine. It should be removed at once.

Treatment.—Special forceps are required, as it is a difficult task to grasp a smooth object lying in the urethral canal. During the manipulations an assistant should make pressure upon the urethra *behind* the foreign body in order to steady it and prevent it from slipping into the bladder. If this method fails, urethrotomy should be performed.

If the body is deeply placed, it may be removed by the urethroscope, or pushed back into the bladder and removed with the aid of the cystoscope.

Bladder.—Objects such as pins, penholders, twigs, hair pins, and pieces of broken catheters have been found in the bladder.

Treatment.—In females, removal should be effected by dilating the urethra to the size of the forefinger and extracting with forceps. The best method is removal by the cystoscope, if possible. In the male, a small object may be removed through the urethra with the aid of the cystoscope, but the simplest method is to perform a suprapubic cystotomy.

Bites

Animals

Dogs.—When a person has been bitten by a dog, it is important to hold the dog for observation, and treat the *patient locally, at once.* If the animal shows signs of viciousness within a week, the patient must receive antirabic treatment. The dog should be sent to the nearest Pasteur Institute in order to have the brain searched for Negri bodies.

Treatment.—Local.—A ligature should be applied to the proximal side of the wound, and cupping or sucking energetically applied. If necessary, the wound should be incised in order to promote free hemorrhage. Next, the wound should be cauterized with common nitric acid, carbolic acid, or the actual cautery. It is a mistake to suppose that wounds do not heal readily after the use of nitric acid. Care must be taken not to apply the acid to bloodless, bony, or cartilaginous parts unless necessary. It should be applied drop by drop from a medicine dropper. If the wound is severe or if the patient be a child, chloroform anesthesia may be required. Wounds made by rabid animals should not be sutured. This very simple method, adopted by the New York Board of Health, gives excellent results.

Preventive Inoculations and Antirabic Treatment.—The Pasteur treatment—which consists of a vaccine not a serum—is now available at some twenty-five institutions in the United States. A list of these is obtainable from the United States Public Health and Marine Hospital Service, Washington, D. C. The virus may be obtained from the Surgeon General on application of health officers. Mulford and Company, Philadelphia, have a complete outfit, with instructions, which is sent by express or by parcel post.

The virus is prepared from the spinal cord of a rabbit which has died from rabies, artificially modified as to its pathogenic properties. It is administered by *daily* subcutaneous injections into the anterior abdominal wall. The treatment lasts from *two to three weeks* (16 injections) and is

given during the incubation period. After the disease has begun, the patient should be kept in a dark room and given morphin, chloral, and chloroform to alleviate pain. The incubation period is from 14 to 100 days. Treatment should be begun within one week from the date of bite, if possible.

For the purpose of determining the presence or absence of signs of rabies the dog is killed and its head cut from the body. The head, packed in ice with sawdust, is then shipped by through express routes, charges prepaid, to insure prompt delivery. From districts outside the city of New York all such material should be sent to the Laboratory of the New York State Veterinary College, Ithaca, New York, where these analyses are made without charge. The New York City Health Department, Research Laboratory, East 16th Street, New York City, is equipped to carry on this work for the city district.

Whenever a dog becomes rabid, the Health Officer should invariably have it killed and examined, as above directed, in order to confirm the diagnosis, because he may subsequently learn of some one having been bitten by the dog when it would be too late to take this step.

Other Animals.—Wounds from other animals require local antiseptic treatment.

Snakes

Treatment.—Local.—Apply a ligature, handkerchief, necktie, or belt, about four inches above the bite. Incise the wound by making a good sized crucial incision, including both fang punctures to allow free local hemorrhage. In addition, sucking or cupping is very serviceable. If one sucks the wound, the mouth should be rinsed with potassium permanganate solution. Stimulate the patient with ounce doses of whisky given every half hour. Strychnin nitrate or sulphate (gr. 1/40) hypodermically every three hours may also be given.

The local poison should be neutralized by ten or twelve hypodermic injections within a radius of two inches of the lesion, of five or six minims of a freshly prepared ten per cent *solution of calcium chlorid*. Crystals of *potassium permanganate* rubbed into the wound is a very efficacious treatment. The ligature must not be left *in situ* for too long a period and may be gradually released for a few seconds, at intervals of fifteen minutes. Absolute quiet should be maintained and the patient should remain in the recumbent position for five or six hours, after which moderate exercise may be indulged in, accompanied by a few doses of strychnin (gr. 1/40) every three hours.

Antivenins.—There are at present several different specific antivenins produced. They are standardized by injecting a mixture of the antivenin serum and snake venom into a rabbit or guinea pig and estimating the

minimum lethal dose. An antivenin must be injected intravenously. At present, the dose is enormous, being 150 to 200 c.c.

Antivenins may be obtained from the Rockefeller Institute, New York.

Chlorinated Lime in Snake Bite.[1]—Riehl has been advocating for several years the use of bleaching powder for treatment of snake bite. Calmette and Paltauf found chlorin effectual in treatment of animals injected with cobra venom in doses otherwise fatal, and Riehl got up a little case for persons exposed to snake bite. The case contains a syringe, two needles, a measuring glass and a few 0,25 gm. tablets of chlorinated lime (bleaching powder). The measuring glass is filled with water up to the 15 gm. mark and one tablet is dissolved in it. The chlorin water thus produced is equivalent to 850 c.c. of chlorin gas in 1,000 gm. water. In case of snake bite a tourniquet is applied to the limb above the bite and the chlorin solution is injected around the spot and into the subcutaneous tissue and muscle. The procedure has proved its usefulness in numerous instances. As chlorin destroys cobra toxin, Riehl is convinced that it will act in the same way on tetanus toxin, in addition to its familiar powerful action as a disinfectant and deodorizer. It seems thus destined to find wide use in warding off and treating tetanus. A mixture of one part chlorinated lime to nine parts terra alba (kaolin) has proved the most convenient method of its use. It is sifted freely into wounds or blown in, powdering the whole of the wounded area thick with it. There is no pain from its application, while the wound cleans up and heals remarkably under it. The earlier it is applied, the better the effect, and Riehl urges its extensive use for all shell wounds and other contaminated wounds.

Insects

Bees, Ants, Wasps, Spiders.—Stings of bees, ants, wasps, and spiders may cause much pain and swelling. For this, cold compresses wrung out of lead and opium water may be applied.

Pediculi capitis.—When the patient is a boy, it is best to clip the hair short, as it is very difficult to destroy the nits. In girls, the head should be repeatedly fine-tooth-combed. A large towel soaked in equal parts of ether and tincture of delphinium should be applied to the head after the hair has been washed in the above solution. The towel should be removed in twelve hours and the hair fine-tooth-combed. This kills the pediculi only and must be repeated for several days before all the nits have become pediculi.

Pediculi corporis or Body Louse.—The clothing should be destroyed or baked for several hours; a hot bath containing one-half a pound of bicarbonate of sodium will cleanse the body and stop the itching.

Pediculi pubis.—Apply blue ointment or white precipitate ointment. It is best to have the hair shaved off and remove the pediculi with forceps.

[1] *Jour. Amer. Med. Assn.*, Feb. 20, 1915.

Shock

(Circulatory Disturbances)

Synopsis: Collapse and shock. Fainting. Seasickness. Mountain sickness. Heat exhaustion. Sun stroke. Heat stroke. Lightning stroke. Electric shock. Freezing.

Collapse and Shock.—These terms are used interchangeably to describe the chain of symptoms which result from severe hemorrhage and other causes. Although in both a fall in blood pressure is the main feature, shock is a much more serious condition than collapse. In collapse, the vasomotor center is inhibited but is capable of responding to stimulation by drugs and other means. In shock, the vasomotor center is exhausted, and consequently requires time for recovery during which the blood pressure must be maintained by other means.

The clinical symptoms of these two conditions are practically identical. There is a marked fall in blood pressure, the pulse is easily compressible, of small volume, rapid, and sometimes irregular. Respiration is shallow, rapid, and irregular. The mentality is depressed, the temperature lowered, the urine suppressed or diminished, beads of sweat stand out on the forehead, and there is a characteristic expression in which the face is pinched and the eyes sunken. Shock is generally caused by severe trauma, hemorrhage, toxemia either from bacterial toxins or drugs, anaphylaxis, chloroform or ether, psychical influences, or fear.

Treatment.—In shock the lowered blood pressure must be raised. This is best done by stimulating the vasomotor mechanism peripherally and not centrally. In collapse the lowered blood pressure responds to a lowering of the patient's head and the administration of cardiac stimulants, such as whisky or camphor. In shock elevate the feet; apply artificial heat, such as hot blankets or hot-water bags.

Pituitary Gland.—Pituitrin is a preparation made from the posterior lobe of the pituitary body and may be obtained from drug houses.

It is supplied in sealed glass phials ready for subcutaneous injection. The effect is similar to that of adrenalin and lasts much longer. Adrenalin should not be given hypodermically or by mouth but by intravenous injection, as the effect will be prolonged over a much longer period of time. Add ten minims of the 1 to 1,000 solution to two pints of normal saline and inject into the patient's median vein.

Saline Infusion.—The effect of saline solution intravenously is only transitory unless given slowly in combination with adrenalin. In exposing the median basilic vein it is not necessary to cut down on the vein. A large aspirating or antitoxin needle may be introduced directly into the

vein, stabbing through the skin and vein wall in the direction of the heart. When the needle enters the vein blood will emerge from its lumen and the rubber tube is then attached to the needle. The amount to be introduced is to be estimated by the effect upon the pulse. It is best not to give over ten minims of the adrenalin solution to one thousand c.c. of saline.

Rectal Infusion.—The enteroclysis of Murphy (Murphy's drip) is not of value in severe shock but is useful in loss of body fluid from prolonged vomiting and in the aftertreatment of peritonitis. The technic of the Murphy drip is given in Section I of this book.

Subcutaneous Infusion.—Hypodermoclysis given by the continuous method, although somewhat painful, is coming back into favor. One or more large hypodermic needles are connected by means of a long piece of rubber tubing with a flask containing the saline solution which is kept constantly at 105° F. The needles are thrust into the thighs or the mammary region in women and the flask is elevated to such a height as to allow the fluid to be forced slowly into the subcutaneous tissue. A pint and a half may be introduced in an hour. If a painful swelling is produced the position of the needle must be changed.

Oxygen.—The continuous inhalation of oxygen is very beneficial in treating shock.

Fainting, Seasickness, Mountain Sickness.—The patient's clothing should be loosened, the head lowered and cold water applied to head and back of neck (*see also* Section XIII).

Heat Exhaustion.—The patient usually has premonitory symptoms, such as giddiness, headache, nausea, vertigo, and vomiting followed by syncope. The temperature remains normal. The patient should be put in a cool place, cold water sprinkled over the head and chest, and ammonia fumes inhaled.

Sun Stroke—Heat Stroke.—There is a sudden onset of loss of consciousness accompanied by hyperpyrexia (103° to 105°), marked dyspnea, sometimes Cheyne-Stokes breathing, the pupils are at first dilated and later contracted; the pulse is very rapid and convulsions may be present. The patient should be rubbed down with cold water or should be wrapped in a sheet wrung out of cold water. An ice bag should be applied to the head. It is important to take the rectal temperature every three or four minutes and discontinue the cold application as soon as the temperature is clearly falling, as collapse may follow.

The patient should remain in bed two or three days and may require hypnotics for headache, irritability, and insomnia.

Prophylaxis of Heat Stroke.—Often it is the apparently most robust who are affected by heat stroke. Loss of sleep, hunger, and nervous strain seem to be predisposing factors. The clothing is an important element in bringing on heat stroke. Persons exposed should pin a wet handkerchief inside of the shirt over the heart and wear a wet cloth under the hat.

Lightning Stroke.—Dash cold water over the victim, with the head lower than the body. Stimulate.

Electric Shock.—Rub the patient down with cold water and apply an ice cap to his head. Give strychnin, alcohol, or coffee to stimulate the heart, and continue cold applications until the temperature descends to normal.

Freezing.—Restore warmth to the body gradually. Rub the limbs with rough cloths wet with cool water, gradually made warmer. Treat the patient in a warm room and give warm stimulating drinks.

Dyspnea—Asphyxia—Choking Spells

Synopsis: Dyspnea, asphyxia, and choking spells of the newborn and premature. Foreign bodies in the respiratory tract. Retropharyngeal abscess. Edema of the glottis. Drowning. Edema of the lungs. Pulmonary thrombosis. Asphyxia from gases. Air embolism. Caisson disease. Bronchial asthma. Hysterical asthma.

Dyspnea, Asphyxia and Choking Spells of the Newborn and Premature.—The throat must first be cleared of mucus with the index finger, over which there is wrapped a piece of gauze, before the following methods are tried:

Schultze's Method.—Wrap the baby in a towel, grasp the shoulders with the thumbs and index fingers, the other fingers being extended along the back of the child which is turned toward the operator. Swing the baby between the knees and then up over the head slowly, frequently immersing in warm water, alternating with cold water.

Mouth to Mouth Insufflation.—Place a piece of wet gauze over the infant's mouth and breathe directly into its mouth, being careful that the nose is not closed.

Lepine's Method.—This method necessitates a special apparatus. It has effected some wonderful results and is very useful in an extensive obstetrical practice. A rubber catheter is inserted into the trachea as far as the bifurcation, through which a continuous current of air passes. This produces a ventilation of the lungs sufficient for oxygenation of the blood even if there are no respiratory movements. The air returns between the tracheal wall and the catheter. The pulse becomes stronger and the respiration starts.

Rhythmical Tongue Traction in Asphyxia.—The tip of the tongue is firmly held by means of a piece of gauze between thumb and forefinger and the tongue is pulled forward and allowed to fall back in unison with thorax compression practiced by an assistant.

Insufflation.—Insufflation is accomplished by means of an ordinary bellows to which a soft catheter is attached, and which is pushed into the

trachea. An apparatus known as the *pulmotor* has been devised for insufflation purposes. It is powerful in its action and must be used with great care and good judgment.

Foreign Bodies in Respiratory Tract.

Nose.—Foreign Bodies (*see* Section XIII).

Larynx.—In many cases the reflex cough dislodges the foreign body. If death does not rapidly result from suffocation the patient's symptoms will be pain, cough, alteration of voice, dyspnea, and great mental distress.

Treatment.—In adults a laryngoscopic examination will reveal the object which may be removed at once with forceps or bronchoscope. In children it is best to give an anesthetic. It may be necessary to locate the foreign body by means of x-rays.

A tracheotomy set should be on hand in case of extreme urgency. An attempt may then be made to dislodge the foreign body by lowering the head and slapping the patient's back, thus inducing a cough; or the finger may be passed into the pharynx so as to cause the patient to vomit.

If these means fail extraction should be attempted with forceps, aided by the laryngeal mirror.

Trachea.—When the body is small its removal may be attempted by lowering the patient's head and raising the chest, when it may be expelled by a paroxysm of coughing.

If a foreign body has been seen on laryngoscopic examination or an x-ray has revealed its location, an attempt should be made to remove it with tracheal forceps and anesthesia. A fluoroscopic screen placed over the patient's chest during the operation is a great aid.

Bronchus.—The patient should be inverted and shaken. If this fails, surgical means, such as a low tracheotomy with the use of a forceps, or a bronchoscopy must be done.

Foreign Body Pneumonias.—The following cases were seen by the writer at the Post Graduate Hospital during 1914. Two of the cases were seen in the wards, an outside diagnosis of unresolved pneumonia having been made without any suspicion of a foreign body in the lungs. The third case had a foreign body history. In the first case the spasmodic character of the cough, the expectoration of pus in an acute condition, and amphoric breathing aroused suspicion of the presence of a foreign body. The x-ray showed a large tack in the right lung, which their bronchoscopist succeeded in removing at a second attempt. Rapid recovery followed. The second case gave a history of unresolved pneumonia and spasmodic cough lasting a year. No pus was found on puncture but the x-ray showed a large nail in the left bronchus and partly in the trachea. Following the removal of the nail by a lower tracheotomy, an extensive pneumonia developed and the child died. In the third case a history of having swallowed a large brass shawl pin was given. The pin had been in the child's lungs forty-three days without causing inflammation and was coughed up. These

cases teach that all unresolved pneumonias and cases of pneumonia of atypical behavior should be x-rayed. Such cases should be reported in the lay press so that they would serve as a warning to those having the care of young children not to teach by example the bad practice of putting things in the mouth.

Retropharyngeal Abscess.—The patient, usually a child, suffers from fever, a rapid noisy characteristic respiration, retracts the head, and has much difficulty in nursing. On palpating the posterior pharynx with the index finger, one finds a soft bulging mass. The abscess may also be seen by reflected artificial light.

Treatment.—Lay the child on a table in the dorsal position and insert a mouth gag if necessary. Have an assistant steady the head and hands. Take a straight dull pointed artery forceps or scissors in the right hand. Place the index finger of the left hand on the most prominent point of the abscess; then pass the closed points of the forceps back along the left index finger until the surface of the abscess is reached. Now thrust the tips of the instrument into the abscess and open *in situ*. It is important on withdrawing the instrument to keep the points separated in order to insure good drainage. The patient must immediately be turned on his abdomen with the head lowered in order to prevent the pus and blood from entering the lungs or stomach.

Edema of Glottis.—The edema is caused by inflammatory affections from contagious diseases, scalds, burns, ulcerations, cellulitis of neck, or foreign body. The non-inflammatory causes are renal disease or angio-neurotic disturbances.

Treatment.—The patient should be put to bed and an ice bag applied to the neck. In an adult a hypodermic of morphin should be given and the throat sprayed with 1 to 2,000 solution of adrenalin. In urgent cases intubation or tracheotomy is indicated.

Drowning.—Clean the mouth, pharynx, and nostrils of any foreign material, such as weeds and sand. Artificial respiration should be commenced at once.

Lay the patient face downward on the ground and kneel across his body, with the hands on his lower ribs. The doctor should allow the weight of his body to fall forward gradually so as to produce firm pressure on the patient's chest. Then with the hands remaining in position, the surgeon should raise his body slowly, relieving the pressure on the patient's chest. The doctor's movements are similar to those of a washerwoman bending up and down over a wash tub, except that the doctor's hands retain the same grasp throughout the movements.

The movements must be repeated about fifteen times a minute and be continued for at least half an hour, in the absence of any sign of restoration of breathing. They should be discontinued at the first gasp the patient takes. An assistant should remove the clothes and the patient should

be wrapped in warm blankets and hot-water bottles applied to the limbs. Friction of the limbs is very beneficial. Cardiac stimulants, such as camphor, caffein, or strychnin hypodermically, may be given when the respiration is restored. Stimulants, such as alcohol or coffee, may be taken by mouth.

Another method of treating apparent drowning is to roll the patient over a barrel, at the same time keeping up artificial respiration.

Edema of the Lungs.—The patient's symptoms are dyspnea, cyanosis, cough, frothy and blood stained expectoration, a rapid pulse, a cold surface, and sometimes coma. Slight dullness and râles are present at the base of the lungs. It is very difficult to distinguish localized edema at the base from beginning lobar pneumonia.

Treatment.—The dyspnea must be relieved and the heart stimulated. To relieve dyspnea morphin sulphate (gr. 1/6) and atropin sulphate (gr. 1/300) should be administered hypodermically. Apply dry cups and turpentine stupes to the chest.

To stimulate the heart caffein sodium benzoate (gr. ii to iv) hypodermically may be given, alternating with camphor in oil (1 to 15) every half hour until the pulse is good. Pituitary extract (gr. ½ to gr. i) hypodermically every three hours is very beneficial. Ergotin may also be employed. In urgent cases venesection is indicated.

Pulmonary Thrombosis.—When a large branch of the pulmonary artery is blocked and death is not immediate, hypodermic injections of ether should be given, ammonia and ether by mouth, and oxygen inhalations. For dyspnea and distress, morphin (gr. ¼) hypodermically may be given.

Asphyxia from Gases.—Carbonic Oxid and Dioxid.—Remove the patient into pure air. Artificial respiration and various methods of stimulation according to the condition in which the patient is found are necessary.

Chlorin—Ammonia—Steam.—In asphyxia from inhalation of chlorin, ammonia, or steam the same procedure as the above is to be adopted. The prognosis in such cases is grave by reason of the intense irritation of the deep respiratory tract.

Treatment.—Loosen the clothing; administer artificial respiration, tongue traction, and stimulation.

Air Embolism—Caisson Disease (*Bends*).—Air embolism is a rare accident, occurring sometimes in giving intravenous infusion or salvarsan. It may occur during operations upon the neck or lungs.

The symptoms depend upon the amount of air introduced. The patient becomes pale; the pulse accelerates; the respiration becomes slow; and the pupils dilate. In operations there is heard a hissing noise and bubbles of air are seen in the wound.

Treatment.—Artificial respiration should be commenced at once in

order to force the air through the lungs and relieve the congestion of the right side of the heart. Cardiac stimulants should be administered.

Bronchial Asthma.—An acute attack is cut short by inhalations of chloroform or amyl nitrite. A hypodermic injection of adrenalin chlorid solution (m. v) gives prompt relief. A hypodermic injection of morphin (gr. 1/6) with atropin (gr. 1/100) will give prompt relief. Other methods are spraying the nasal mucous membrane with two per cent cocain, and inhaling the fumes of burning stramonium leaves mixed with saltpeter. Tincture of stramonium (m. x) with potassium iodid (gr. v) frequently helps and is very useful in the subacute dyspnea which often persists between attacks. Following the attack the patient's nose should be examined for obstruction and scratch tests should be made for food allergy (*see* Section I).

Hysterical Asthma.—In this condition there are no râles present and the patient is readily brought out of the attack by holding a bottle of ammonia under the nose or pressing on the supra-orbital nerve.

Pain

Synopsis: Gastro-intestinal colic. Colic in mucous colitis. Gastric crises in tabes. Lead colic. Renal colic. Biliary colic. Pancreatic colic. Spurious or pseudo angina pectoris. True angina pectoris. Menstrual colic. Ear ache. Tooth ache.

Gastro-intestinal Colic.—The patient's history will reveal the ingestion of some putrid or poisonous food, such as canned meats, ice cream, etc.

Symptoms.—Colicky pain, vomiting, rumbling gases, furred tongue and, sometimes, fever.

Treatment.—Empty the stomach by lavage or emesis and give a brisk cathartic followed by a high soapsuds enema. For pain give Magendie's solution (m. x) or morphin sulphate (gr. 1/6) hypodermically every two hours until relieved. A hot-water bag to the abdomen will also relieve the pain. For the vomiting and thirst, give cracked ice.

The patient should remain in bed two or three days and partake of a fluid diet until fully convalescent. Instead of morphia the following mixture may be given:

℞ Tinct. opii.....
Tinct. castorei..... āā ℥ii
Tinct. valerian.....
Sig. 10 to 20 drops every two hours until relieved.

Colic in Mucous Colitis.—*Symptoms.*—The symptoms are colicky pain, tenderness of the colon, diarrhea, and numerous watery stools containing mucus and, sometimes, blood.

The pain is generally in the lower quadrants and is often mistaken for appendicitis. However, there is no fever or leukocytosis.

Treatment.—If the pain is severe give the patient a hypodermic of morphin; apply hot fomentations and flush the colon with a high oil enema. Administer castor oil (℥iv to ℥i) in order to evacuate the small intestine. Give opium and valerian mixture, as recommended for gastro-intestinal colic.

If the acute attack is over the constipation, which is the cause, should be treated by exercise and a diet containing a large quantity of cellulose. The patient should also take liquid albolene (aromatic) ℥ii every night.

Gastric Crises in Tabes.—The pain and vomiting may be so severe as to simulate perforated gastric ulcer, obstruction, appendicitis, peritonitis, etc. The Argyll-Robertson pupil, the absence of knee jerks, the low blood count, and the history of a specific lesion will help to make a differential diagnosis. When gastric and duodenal ulcers are accompanied by tabes, it is impossible to make a correct diagnosis without a laparotomy.

Treatment.—All food by mouth should be withheld. If necessary, begin rectal feeding. If the blood pressure is high give nitroglycerin (gr. 1/100) three times a day.

For the pain caused by the vomiting give per rectum antipyrin (gr. xx), phenacetin (gr. xx), pyramidon (gr. x), or aspirin (gr. xx). If not relieved it will be necessary to give morphin hypodermically. After the attack is over put the patient on mixed treatment plus salvarsan, or give intravenous injections of salvarsanized serum.

Lead Colic.—*Symptoms.*—These include paroxysms of colicky pain preceded by constipation. The patient rolls around the bed, the abdominal muscles are rigid, and the abdomen retracted. Other signs, such as the blue line on the gums, will be present, also anemia, albuminuria, basophilic degeneration of the red cells, and sometimes wrist-drop.

The patient's occupation should be ascertained.

Treatment.—For the pain give morphin, codein, or inhalations of amyl nitrite. A hot bath followed by hot fomentations is also very useful. Free venesection has also been recommended.

To rid the intestines of the toxins give magnesium sulphate (℥iii) followed by an enema. After the attack give daily doses of one ounce of magnesium sulphate, and potassium iodid (gr. v).

Renal Colic.—*Symptoms.*—Sudden lancinating pain in the flank, radiating down the ureter toward the groin and into the testicle; sweating; vomiting; and hematuria.

Treatment.—A hypodermic of morphin (gr. ¼ to ½) must be given and repeated if necessary. Chloral hydrate (gr. x to xxx) is also of benefit. Chloroform inhalations may be required in severe cases. A hot bath followed by a hot-water bag over the lumbar region gives great relief. After the attack the patient should have an x-ray exposure to confirm the diag-

nosis. It is best to remove the stone as soon as possible in order to prevent destruction of the kidney by back pressure and pyelitis.

Biliary Colic.—The onset is often sudden. Severe paroxysmal attacks of pain are felt in the right upper quadrant and dorsal region between the eighth and eleventh dorsal vertebra. The pain radiates to the right shoulder, left upper quadrant, or umbilical region. The onset is often accompanied by a rigor. Fever and vomiting are common; jaundice may appear rapidly. There are present tenderness in the gall-bladder region and spasm of the upper part of the right rectus.

Biliary colic must be differentiated from (*a*) renal colic, in which the pain radiates downward into the testicle and the urine may contain blood and pus, and (*b*) gastric ulcer, with a history of pain in relation to meals, occasionally hematemesis and blood in stool, (*c*) appendicitis.

Treatment.—It is almost always necessary to give morphin sulphate hypodermically. If the attack is extremely severe, chloroform may be given. A hot-water bag applied to the gall-bladder region following a hot bath is very beneficial. The bowels should be opened with a saline laxative.

If a second attack occurs, operation must be considered.

Pancreatic Colic.—*Symptoms.*—Sudden onset of pain in the left epigastrium which soon becomes diffused over the abdomen. The symptoms of shock are extreme; vomiting appears early; the abdomen is rigid and soon becomes distended. It is impossible to differentiate positively from intestinal obstruction or perforated gall-bladder.

Treatment.—The treatment is surgical.

Spurious or Pseudo Angina pectoris.—This condition is found in young girls and women of the neurotic type.

Symptoms.—Tingling, deadness and stiffness over the precordium and left arm, with pain in the back and neck.

Treatment.—The patient's clothes should be loosened and ammonia fumes administered by the nose. Internally ethereal tincture of valerian (m. xx) should be given in water.

True Angina pectoris.—The patients having this condition are generally past middle life; the blood pressure is high, or they have an aortic valvular disease, aneurism, or myocardial degeneration.

Symptoms.—The attack in an average case is very characteristic but a mild attack is not suspected until it recurs.

Treatment of an Attack.—Break an amyl nitrite pearl in a handkerchief and have the patient inhale the fumes. Nitroglycerin (gr. 1/100) in tablets is very efficacious. A hot-water bag over precordium and a hot drink will often give relief. Hoffmann's anodyne (m. x) in water by mouth is very effective. If the pain does not yield to the above treatment a hypodermic of morphin must be given (gr. ¼ to ½).

Treatment Between Attacks.—The patient should avoid overexercise, overeating and exposure to severe weather conditions. The bowels should

be kept open. A course of iodid of potassium (gr. v to x) three times a day should be given, and such treatment as is recommended under Cardiac Insufficiency (Section IX).

Menstrual Colic.—The treatment consists of a hot sitz bath, hot-water bags to abdomen and lumbar region, and hot drinks.

Medication.—Fluid extract of viburnum prunifolium (m. xxx) every four hours, or ammonol (gr. v) every three hours.

Ear Ache.—Apply a hot-water bag to the region of the ear; pour warm olive oil into the ear or warm boric acid water containing one-half per cent cocain.

Tooth Ache.—*Emergency Treatment.*—Cleanse the cavity of the tooth with warm boric acid water and plug the cavity with absorbent cotton saturated with oil of clove or chloral hydrate or four per cent cocain solution; or cleanse the cavity of the tooth with a warm antiseptic wash. Apply tincture of iodin and tincture of aconite (equal parts) to the gum around the tooth and place an ice bag to the face.

Burns

Synopsis: Burns due to: Fire; Steam; Hot water; Grease; Electricity; Lightning; Chemicals (ammonia, lime); Acids (hydrochloric, nitric, carbolic); Powder, Sliding down a rope.

Fire, Steam, Hot Water, Grease.—A burn caused by dry heat and a scald caused by moist heat, such as steam or grease, are treated by similar methods.

Burns, for therapeutic and prognostic purposes, are divided into three degrees. Burns of the first degree involve the epidermis; those of the second degree the entire thickness of the skin; and those of the third degree involve the skin and any tissue beneath the skin, such as muscles, vessels, and bone.

Treatment.—Burns of the first and second degree, covering small areas, are treated locally by applying carron oil, zinc oxid ointment, ichthyol, or a powder of zinc oxid and boric acid (equal parts). Common baking soda is beneficial under a dry dressing.

A rapid healing method is to spread bismuth paste on a bandage and apply directly to the wound.

In burns of the first or second degree—involving an entire extremity, and burns of the third degree, the principal effort must be to overcome the shock. The patient should immediately be put into a tub of hot water containing several ounces of boric acid. The boric acid will float upon the water unless it is made into a paste by adding a little water and stirring until a creamy fluid is obtained.

The patient should remain in the bath for about fifteen minutes, during which time the clothing should be cut away and the bed made ready.

Protection of the raw areas is best obtained by covering them with gauze soaked in one-half per cent picric acid. The patient should then be put to bed, wrapped in warmed blankets, and warmed by hot-water bags. The foot of the bed should be raised, and cardiac stimulants—especially strychnin—are given. If the patient does not react quickly to the above treatment it will be necessary to perform an intravenous infusion.

Aftertreatment.—The septic complications, absorption, and the sloughing, are best taken care of by the boric acid hot bath.

This bath, lasting about twenty minutes, should be given twice a day until the lesions are completely healed. Between baths the burns should be covered with unguentine ointment spread on linen. The tub should be near the bed and the room kept warm during the process.

Following the complete separation of the sloughs, the granulating surfaces should be grafted.

Electrical Burns—Lightning.—*Local Treatment.*—Immediately following the burn the local treatment is similar to the treatment of the fire or steam burn, given above. A few days following the accident, gangrene may appear—necessitating surgical removal.

Chemical Burns.—

Lime.—Surface of *skin* or in the eye. Do not wash with plain water but remove lime particles and apply a solution of sugar. Wash the eye or skin burn with boric acid solution. Keep the pupil dilated with one per cent atropin and instill a drop of any pure oil into the eye every two hours.

Ammonia.—Wash the area with water or a weak acid solution, such as vinegar or lemon juice, or apply olive oil, milk, or white of egg.

Acids.—*Hydrochloric Acid and Nitric Acid.*—Wash burned part immediately with water and cover with bicarbonate of soda. If in a laboratory or drug store apply a dilute solution of ammonium or sodium hydroxid.

Carbolic Acid.—Externally submerge the burned area in strong alcohol, milk, olive oil, or a solution of magnesium sulphate or sodium sulphate.

Powder Burns.—Extract immediately, if possible, every particle of powder—if the patient's general condition will stand the strain. Apply hydrogen peroxid, and expose the area to the sunlight until thoroughly healed. In old powder burns the application of carbon dioxid snow is very effectual in removing the dark spots.

Sliding Down Rope Burns.—The treatment is similar to that for fire burns, as described above. The hand should be kept in complete extension by means of a splint in order to prevent contractures.

Convulsions and Delirium

Synopsis: Convulsions in: Epilepsy; Uremia; Tetanus; Acute infections; Gastro-intestinal disturbances; Acute mania; Hysteria; Apoplexy; Concussion of the brain. Delirium from: Acute and chronic alcoholism; Infectious diseases; Cerebral inanition; Acute mania; Hysteria.

Convulsions

Convulsions in Epilepsy.—*Symptoms.*—The skin is pale or cyanotic; there are convulsive movements, frothing at the mouth, seminal emissions; the tongue is bitten, and the pupils react to light. The temperature, pulse and respiration are not characteristic.

Treatment.—The head should be slightly raised, the clothes loosened and a handkerchief or cork pushed between the teeth. If the convulsions continue the most reliable measures are inhalations of amyl nitrite or chloroform, hypodermic injections of hyoscin (gr. 1/100), morphin (gr. ¼), enemas of chloral (20 to 30 gr.) and the hot bath.

Convulsions in Uremia.—*Symptoms.*—Pale, cyanotic, edematous face, or general dropsy; stertorous breathing; full pulse; high blood pressure; urine contains albumin and casts.

Treatment.—Give the patient a high colonic irrigation; administer a hot pack for twenty minutes; give a brisk cathartic; and if necessary draw off the urine with a catheter. If the paroxysms recur several times, decapsulation of the kidneys should be considered (also spinal puncture).

Tetanus Convulsions.—The patient usually has an abrasion of the feet or hands. The onset is slow and begins with a rigidity of the muscles of the neck and lower jaw which spreads to the back, abdomen, and lower extremities. The jaws become tightly closed, the corners of the mouth are drawn upward, and the head is drawn backward. The temperature is high and there is extreme hyperesthesia. The mind is clear to the end.

Treatment.—The wound should be enlarged and a wet antiseptic dressing applied. Tetanus antitoxin should be injected in large doses, at once.

For the convulsions give large doses of bromids by mouth, and chloral by rectum. The patient should be kept absolutely quiet and protected from cold.

Convulsions in Acute Infections.—The acute infectious diseases should receive their specific treatment. For the convulsions the patient should be given an enema and a bath (100° F.); chloral hydrate (gr. xxx) by rectum and bromids (gr. xv) by mouth. The chloral by rectum may be repeated in two hours if necessary. Young children receive one-tenth of adult dose.

Gastro-intestinal Convulsions.—A high colonic irrigation of two quarts of saline solution should be given, and a brisk cathartic administered. If

the convulsions do not cease it will be best to give the patient bromids and chloral and wash the stomach.

Hysterical Convulsions.—Organic disease must be excluded. If the patient is in a hysterical coma, inhalations of the fumes of aqua ammonia will readily revive the patient.

This to be followed by a cold pack or tub bath. The patient should not receive too much sympathy. The symptoms should be treated but morphin should never be given. Active restraint should not be indulged in as it increases the violence of the attack. Hysterical patients rarely inflict self-injury.

Pressure on sensitive areas, allowing the patient to inhale ammonia fumes, and a strong faradic current will often cut short an attack. An effective method is to inject hypodermically one-sixth of a grain of apomorphin. With the onset of the vomiting, the attack ceases.

Convulsions in Acute Mania.—Use mechanical restraint. Give a brisk purgative. For quieting the restlessness give paraldehyd, sulphonal, or bromids.

Hydrotherapy is used principally in institutions and if possible should be carried out in private practice. Sheets wrung out in cold water are applied to body and changed at ten-minute intervals. If the attack is severe or long continued, the patient should be removed to a sanitarium.

Convulsions with Apoplexy.—*Symptoms.*—Pale skin; no sign of injury; paralysis evident; slow stertorous breathing; irregular, weak pulse.

Treatment.—Give the patient an enema, apply an ice cap to the head and a hot-water bag to the feet. The patient should be kept absolutely quiet. About ten ounces of blood, in an adult, may be removed from the median vein.

Convulsions in Concussion of the Brain.—The symptoms come on after injury. The pulse is weak and may be rapid, and irregular; the respiration is shallow and slow; the pupils are equally contracted and react to light.

Treatment.—The patient must be put to bed and kept absolutely quiet, and an ice bag applied to the head. Extension of paralysis and symptoms of cortical hemorrhage should be watched for, as the skull may have to be trephined in order to ligate the middle meningeal artery.

Delirium

Alcoholic Delirium.—When a patient, who has been drinking for a long period or who suddenly ceases drinking after a few days' spree, shows premonitory symptoms of delirium—such as sleeplessness, irritableness, refusal of food—he should be put to bed, guarded, and treatment started. The supply of alcohol should not be cut off too suddenly. Mixed bromids,

veronal or trional or chloral hydrate should be given to quiet the patient's nerves. The alcohol should be gradually decreased and the following medication prescribed:

℞ Acid. nitromuriatic dilut. .....
Tinct. nucis vomic. ..... āā ʒii 8,0
S. Ten drops every 4 hours in water.

Active Alcoholic Delirium.—The symptoms are restlessness, marked tremor, hallucinations, illusions, and incoherence of speech.

Treatment.—The patient should be kept in bed with sheets and close watch kept over him to prevent infliction of self-injury. Sleep may be induced by giving large doses of chloral hydrate and potassium bromid (āā gr. xxx), paraldehyd (m. xxx), sulphonal (gr. xv), or a subcutaneous injection of hyoscin hydrobromid (gr. 1/200 to 1/100). Alcohol should be gradually withdrawn and, if possible, treatment for chronic alcoholism begun. In long continued delirium spinal puncture is indicated.

Other Forms of Delirium.—The symptomatic management of all other forms of delirium are practically the same as in the alcoholic variety.

Urinary Retention and Suppression

(*See also Section X*)

The causes of obstructive retention are acute inflammatory conditions in and around the urethra, such as acute gonorrhea, injury to the urethra, foreign body in the urethra, prostatic enlargement and, occasionally, stone or tumor of the bladder, causing a mechanical obstruction at its neck.

The causes of non-obstructive retention are disease or injury of the spinal cord, functional, and reflex nervous conditions, as after operations. In complete suppression of the urine, the bladder is empty, or nearly empty. The history of the case will point to the cause. Palpation, percussion, the passing of a sound, and the examination of the prostate will enable one to make a correct diagnosis.

Treatment.—A hypodermic injection of morphin sulphate (gr. ¼) should be given, and the patient be made to take a hot sitz bath. He should try to void while in the bath. Another method is to administer a hot soapsuds enema and apply a hot-water bottle to the suprapubic region.

If the above methods fail, it will be necessary to pass a catheter or do a suprapubic puncture.

In acute urethritis a catheter is contra-indicated, except in urgent

cases, as it will spread the infection to the prostate and bladder. It is also very painful.

Suprapubic Puncture.—This is a simple procedure and the patient very rarely suffers from after effects.

The pubes having been shaved and painted with iodin (3 per cent) solution, a small sterilized trocar and cannula should be thrust into the bladder, keeping exactly in the midline and going in just above the pubes. It is best to use local anesthesia. On withdrawing the trocar, the urine escapes into a vessel.

When the urine ceases to run, the cannula should be withdrawn and the little wound sealed with collodion or adhesive plaster. There is rarely extravasation of urine through the wound. The patient should be kept in bed for several days; he should have a light diet; and saline aperients should be administered.

Poisoning

General Principles of Treatment

There are several general rules that can well be remembered in treating cases of poisoning by mouth.

1. If the patient has not taken corrosive poison the mouth will show no burns and the stomach contents can be evacuated by *lavage* or *emetics*. If the patient has taken corrosive poison it is better to at once give a large amount of warm oil and demulcents: egg white, gruels, milk, condensed milk, soap.

2. Administer the proper antidotes, chemical and physiological.

3. Sustain the natural process of life by all reasonable and quickly responsive means at hand: hot blankets, hot-water bottles, and coffee by mouth or rectum.

Treat syncope by ammonia and ether by mouth: camphor in oil, intravenous saline infusion.

Treat respiratory failure by artificial respiration; cold effusions; oxygen inhalations, or apply the pulmotor.

4. Hasten elimination of poison. Give water internally and warm baths.

In poisoning by *alkaloids,* intravenous infusion of saline solution or venesection are indicated.

Emetics

(*a*) Give several glasses of warm water and tickle the throat.

(*b*) Mustard—one tablespoonful to a glass of warm water.

(*c*) Zinc sulphate—30 grains in a glass of warm water.
(*d*) Copper sulphate—10 grains in a glass of warm water.
(*e*) Apomorphin—1/10 grain by hypo.
(*f*) Powdered ipecac—30 grains in a glass of warm water.

List of Poisons and Antidotes—Emergency Treatment

(Grouped for Ready Reference)

Poisons	Antidotes and Treatment
Carbolic Acid Creosote Disinfecting Fluid	Lavage with care. Magnesium or sodium sulphate (½ oz. in 8 oz. of water). Demulcents: milk and olive oil. Stimulants. Intravenous or rectal injections of normal saline.
Chromic Acid	Lavage. Stomach tube to be used with great care. Chemical antidote: chalk (½ oz. in ½ pint of milk). Demulcents: milk, olive oil, gruel or white of egg.
Hydrocyanic Acid Cyanides Bitter Almond Oil	General principles—particularly treatment for respiratory failure. Stimulants: ammonia and ether and brandy by mouth. Inhalations of ammonia.
Oxalic Acid	*Caution*—Lavage or emetic, if case is treated *soon* after the poison is swallowed. Chemical antidote: chalk, whiting or wall plaster (½ oz.) stirred in water; sacch. solution of lime (2 drams in water) repeated every ½ hour for eight doses. Demulcents: milk, olive oil, gruel, or white of eggs.
Soldering Fluid Battery Fluids Hydrochloric Acid Nitric Acid Sulphuric Acid Spirit of Salt Muriatic Acid Aqua fortis Acetic Acid Butter of Antimony	*Caution*—Lavage or emetics inadmissible. Chemical antidotes: magnesia (½ oz. stirred up in water); chalk, whiting or potassium bicarbonate (2 drams in water); sacch. solution of lime (2 drams in water). Demulcents: milk, white of egg, thick gruel.

Aconite Aconitin	General principles—especially treatment for respiratory failure. Stimulants: strychnin hypodermically, brandy. Saline infusion.
Alcohol, Grain	General principles—especially cold effusions, faradism, artificial respiration. Hot coffee per rectum. *See also* Delirium (Section XIV).
Alcohol, Wood	General principles—early use of pilocarpine hydrochlorate in ⅛ to ½ gr. doses. Give grain alcohol. In coma, warm baths followed by cold effusions.
Alkalies Potash Soda Ammonia Hartshorn Weed-killer	*Caution*—If much destruction of mucous membrane, do not use stomach tube. Emetics inadmissible. Chemical antidote: citric or tartaric acid (20 grains in water); vinegar or lemon juice (1 oz. in water). Demulcents: olive oil, milk, white of egg. Stimulants (not ammonia).
Anilin	General principles—especially treatment for respiratory failure. Venesection, followed by saline infusion.
Antimony Salts Tartar Emetic Butter of Antimony	General principles—especially treatment for collapse and stimulants. Chemical antidote: tannic acid (gr. xx in water). Demulcents: milk, white of eggs. *Caution*—Avoid lavage.
Arsenic Compounds White Arsenic Weed-killers Sheep Dips "Rough on Rats" Fly Paper (some) Paris Green	General principles. Chemical antidote: hydrated ferric oxid made when required by adding to ½ oz. of liquor ferri perchlor. in a glass of water ¼ oz. of magnesium or ½ oz. of washing soda in water. Collect the precipitate on a handkerchief, mix with half glass of hot water, and repeat frequently.
Atropin Belladonna	General principles—especially treatment for respiratory failure. Chemical antidote: tannic acid (gr. xx in water).

Poisons	Antidotes and Treatment
Stramonium Hyoscyamus Hyoscin	Lavage. Physiological antidote: pilocarpin nitrate (¼ grain hypodermically). Stimulants.
Barium Salts	General principles. Chemical antidote: magnesium or sodium sulphate (½ oz. in 8 oz. hot water).
Calabar Bean Physostigmin Eserin	General principles. Lavage. Chemical antidote: tannic acid (gr. xx in water). Physiological antidote: atropin sulphate (gr. 1/50) hypodermically, and repeated every 15 minutes until pupils dilate.
Camphor Camphorated Oil	General principles.
Cantharides	General principles. Demulcents.
Chloroform	Inhaled: Artificial respiration. Swallowed: General principles.
Cocain	General principles. Inhalations of amyl nitrite.
Conium Hemlock	Lavage. General principles. Stimulants.
Copper Blue Vitriol Verdigris	General principles. Chemical antidote: potassium ferrocyanid (gr. xx in water). Demulcent: milk.

Digitalis	Lavage. General principles. Chemical antidote: tannic acid (gr. xx in water). Stimulants.
Fungi (Toadstool)	General principles. Emetics: atropin sulphate (gr. 1/50 hypodermically).
Gases Carbon Monoxid Gas Coal Gas Sewer Gas Acetylene Chlorin Nitrous Fumes Ammonia Fumes	General principles—especially artificial respiration and oxygen inhalations.
Hypnotics Chloral Hydrate Chloralamid Sulphonal Paraldehyd	Lavage. General principles. Stimulants, especially strychnin hypodermically.
Iodin	General principles. Chemical antidote: prepared chalk or calcined magnesia in water. Demulcents—copiously.
Lead Salts	General principles. Chemical antidote: magnesium or sodium sulphate (½ oz. in glass of water).
Mercury Salts White Precipitate Red Precipitate Corrosive Sublimate	General principles. Demulcents: milk and white of egg. In anuria from mercury poisoning intravenous administration of a 10 per cent glucose solution is of benefit; also renal decapsulation. (*See* page 952.)

Poisons	Antidotes and Treatment
Phosphorus Rat Paste Match Heads	General principles. Chemical antidotes: copper sulphate (gr. ½ in 3 oz. of water repeated about 4 times in the first hour). Demulcents—*avoid oil.*
Pilocarpin	General principles. Chemical antidote: tannic acid (gr. xx in water). Physiological antidote: atropin (gr. 1/50 subcutaneously).
Ptomaines Stale Foods Spoiled Canned Foods	General principles—especially treatment for collapse. Chemical antidotes: tannic acid (gr. xx in water); calomel (gr. v) followed by saline purge.
Silver Salts	General principles. Chemical antidote: one tablespoonful of common salt in water.
Strychnin	General principles. Emesis by apomorphin or lavage. Chloroform by inhalation. Chemical antidote: tannic acid (gr. xx in water). Physiological antidote: chloral hydrate (gr. xxx in water) or potassium bromid (gr. xxx), repeated if necessary.
Turpentine Polishing Fluid	General principles. Lavage with milk.
Zinc Salts	Chemical antidote: sodium or potassium bicarbonate (2 drams). Demulcents: milk and white of egg; afterwards lavage or emetics.

Mineral Oils Benzoline Paraffin Petroleum	General principles. Demulcents: olive oil freely, followed by free lavage with milk.
Opium Morphin Codein Chlorodyne Laudanum Paregoric Heroin	General principles. Chemical antidotes: tannic acid (gr. xx in water), freely washing out after each dose; or wash out stomach with solution of potassium permanganate (gr. ii to quarts ii of water). Physiological antidote: atropin sulphate (gr. 1/50). Stimulant: coffee. Keep the patient awake. Artificial respiration. Faradic current. Empty the bladder and bowels. Sit by the patient and order deep inspirations.

Detailed Treatment in a Case of Bichlorid Poisoning

In one of the writer's "successful" cases of mercuric bichlorid poisoning, in which mercury was found in vomit, urine, feces, etc., and in which pain, vomiting, anuria, slight albuminuria, and refusal to swallow were the distressing features in a woman of 28 who swallowed two bichlorid tablets in a tumbler of water, the following treatment was adopted:

Feeding by gavage.

Gastric lavage with albumen water and bicarbonate of sodium twice a day.

Rectal irrigations, Hypodermoclysis, Murphy drip } saline

Catheterization

Hot pack

Stimulation

Sedatives

The **food** given was:

Lemon juice, Sugar, Lactose, Gum arabic, Egg white } in water

Hot water

Milk

Condensed milk

Ice cream

Gruels

The **drugs** used were:

℞ Solut. magendi, gtt. vii

Codein, gr. ½

Caffein. sod. benzoat, gr. iii every 6 hours by hypo.

Codein, gr. ½
Veronal, gr. v } pro dosi

Orthoform, gr. v
Gum acacia, gr. x
Water, ℥ii } before feeding.

M.

The **details of this case** are reported[1] by Drs. Jacob Cohen and A. Bernhard of the house staff of the German Hospital, New York City, as follows:

Colonic irrigation, gastric lavage and hot packs, twice daily; continuous Murphy drip containing potassium acetate, 1 dram to 1 pint of water.

[1] *Jour. Amer. Med. Assn.*, April 1, 1916.

The patient was given by mouth 8 ounces of the following solution every hour, alternating with the same quantity of milk:

℞ Potassium bitartrate ..... ʒ 1
Sucrose ..... ʒ 1
Lactose ..... ʒ ½
Lemon juice ..... ʒ 1
Boiled water ..... ʒ 16
M.

On catheterization, 75 c.c. of urine were obtained which, on analysis, showed a very large amount of albumin, a specific gravity of 1.020, and many coarsely granular and hyaline casts. The patient vomited continuously, and was unable to retain even small amounts of fluid, and refused nourishment. The systolic blood pressure was 136, and diastolic blood pressure 100 mm. of mercury. The leukocyte count was 11,000, of which 74 per cent were polymorphonuclears, and 26 per cent lymphocytes.

From November 28 to December 2, the patient began to eliminate greater quantities of urine; her condition seemed better, except that she complained of burning pain along the entire gastro-intestinal tract. The restlessness subsided, and she appeared brighter, but continued to refuse food. Gavage and duodenal feeding were resorted to, but because of marked irritability of the esophagus and stomach, had to be discontinued. Hypodermoclyses were then attempted, but soon discontinued because of the excessive pain they gave the patient.

The urine elimination during this period rose from 200 to 700 c.c., and the urine showed albumin, pus and hyaline and granular casts in moderate amounts.

Stomach washings, colonic irrigations, urine and feces were examined in the laboratory for mercury. The Vogel test was employed, a positive reaction being indicated by formation of an amalgam of the mercury with gold, in a sealed tube. On the first day the urine and feces gave a positive mercury reaction, on the second day the lavage and feces were positive, and on the third day the urine, feces and gastric contents all responded to the test for mercury.

The phenolsulphonephthalein test on this day showed an elimination of 22 per cent for two hours. The figures for the nonprotein nitrogen and urea are somewhat lower than those reported by Foster, and Myers and Fine. No study of chlorid or nitrogen metabolism was attempted, since ingestion of food was made uncertain by vomiting.

From December 2 to December 7, the patient had severe gastric pains, with continued vomiting. The gastric analysis and string test and roentgenoscopy did not indicate the presence of an ulcer. The patient's general condition was improved, with a urine elimination of 700 c.c. in twenty-four hours, showing a decreased amount of albumin, and few casts. No mercury was found in the excretions, with the exception of the feces, which were positive for one day only (December 4). December 6, the blood was again examined, showing a decrease of nonprotein nitrogen to 32 mg. per hundred c.c. of blood, of which the urea nitrogen was 65 per cent, or 21 mg., and an increased phenolsulphonephthalein elimination to 34 per cent.

At the end of this period the vomiting subsided, the patient took more nourishment, and the feces contained no more mercury. The colon irrigations and lavage were then discontinued. The blood pressure was lower (systolic 118, diastolic 70 mm. of mercury).

Sodium phosphite has been suggested as an antidote to mercuric chlorid because it acts as a reducing agent to convert mercuric chlorid into calomel

—mercurous chlorid—while the phosphite is changed to phosphate. Sodium phosphate will have no such action on mercuric chlorid because it is already as highly oxidized as possible.

Management of Drug Addiction and Alcoholism

An effectual method of treating these conditions is by the Towns-Lambert method, as carried out in the alcoholic wards of Bellevue Hospital, New York City.

Morphinism—Cocainism—Opium Addiction.—*Treatment.*—On the *first day* give 4 compound cathartic pills and 5 grains of blue mass; also a soapsuds enema.

On the *second day* give the following medication known as the specific:

℞ Tinctur. belladonn. (15%) ..... ℥ii 60,0
Fluid extract xanthoxyl. ..... } āā ℥i āā 30,0
Fluid extract hyoscyam. ..... }
M. S. Give min. vi-vii every one hour throughout the treatment, increasing min. ii every six hours until min. xvi are given every hour.

If signs of belladonna poisoning develop, stop the specific; when they disappear, begin again with doses of m. viii. Give with the first dose of the specific one-half to two-thirds of the usual total daily dose of opium or morphin which the patient is taking at the time of his treatment.

Divide this amount of narcotic into three doses and give at half-hour intervals.

Fourteen hours after the first dose of the specific give 4 c.c. pills and 5 grains of blue mass. Again six hours later repeat 4 c.c. pills. It is essential that the cathartic should act at this time and if the above amounts do not produce the desired action within three or four hours, they must be repeated with the addition of five to ten grains of blue mass.

After the bowels have acted—but not before—one-half the original dose of the narcotic may be given. This will make the patient comfortable and contented for the final stage.

Twelve hours after the second dose of the narcotic again give 4 c.c. pills with 5 grains of blue mass; and six hours later give one ounce of castor oil in orange juice. Just before the castor oil acts it may be necessary to give codein (gr. ii) hypodermically or by mouth to quiet the nervousness.

The castor oil at this time will produce the characteristic stool—an in-

dication that the entire treatment may cease. This is a liquid green stool composed of mucus and bile. The patient will now feel relaxed and comfortable.

Thirty hours after treatment begins the patient should get a cardiac stimulant every three hours, such as strychnin or digitalis.

Diet.—During the treatment the patient may have a diet of eggs, vegetables, cereals, bread, butter, coffee or tea.

Treatment of Morphinism in Chicago House of Correction, as recommended by Dr. Charles E. Sceleth, Superintendent:

When patients are received in the hospital they are given a preparatory dose of saline cathartic. The basis of the medical treatment is the following:

℞	Scopolamin hydrobromid.....	gr. 1/100
	Pilocarpin hydrobromate.....	gr. 1/12
	Ethyl-morphin hydrochlorid—(dionin).....	gr. ss
	Fluid extract cascara sagrada.....	mn. xv
	Alcohol	mn. xxv
	Water .....q.s. ad	3i
M.		

The dose is varied according to the extent of the addiction. Patients vary from 1 to 2 grains to as many as 60 to 90 grains a day of morphin. When more than 10 grains of morphin per day are being taken, 60 minims of the above mixture is given every three hours day and night for six days. On the seventh day the dosage is reduced to 30 minims, the eighth 15 minims, and on the ninth 15 minims three times a day instead of every three hours day and night. On the tenth day the mixture is discontinued and strychnin nitrate, one-thirtieth of a grain, three times a day, is used. On the eleventh day strychnin nitrate, one-sixtieth of a grain, is given, and this is continued for a week. During the first five days only light diet is given, but patients are encouraged to take liquids freely.

If a patient is using less than 10 grains of morphin a day, the dose should be 30 minims of the mixture to begin with. If he is using less than 5 grains, 15 minims is used as a starting dose. During the first three days the patients suffer from insomnia, and in about 10 per cent of the cases vomiting; this is to be expected. If the pulse goes below 40 or above 120, the mixture is stopped for a single dose. If there is collapse, one-half grain of ethyl morphin hydrochlorid or one-fourth grain morphin is given hypodermically. In about 4 per cent of the cases a scopolamin delirium may develop. In such instances the mixture should be given without scopolamin for two doses, and then continue with scopolamin in one two-hundredth-grain doses.

During the treatment no other drugs should be used. After the fifth day the patients will have no further desire for morphin. Up to this time they care very little for food, but after the fifth day they develop a ravenous appetite and will gain weight rapidly. Extremely emaciated patients will gain a pound a day for the first thirty days.

Generally speaking, the results of the treatment have been quite efficient, and have been found on comparison to secure more lasting results than the atropin treatment. The patient should be directly under the physician's care, but after eleven days, the strychnin treatment may be safely entrusted to the patient.

The final results are, of course, dependent on the cause of the addiction. If, since the beginning of the habit, the cause has been removed, the patients are permanently cured and do not return to the habit. Where the cause persists, whether it be functional neurosis, a degenerate mentality or criminality, the patient occasionally returns to be treated anew. The treatment of the cause should be borne in mind at the time any corrective treatment is undertaken.

Alcoholism.—*Treatment.*—The specific is the same as that used for morphinism (p. 954). Alcoholics are very sensitive to belladonna poisoning, which must be looked for very acutely. When an alcoholic is in the middle of a spree it is necessary to put him to sleep immediately—after he has taken the 4 c.c. pills and the 5 grains of blue mass.

The best *hypnotic* in this case is

℞	Chloral. hydrat.	gr. xv	1,0
	Morphin.	gr. ⅛	0,008
	Tinctur. hyoscyam.	ʒss	2,0
	Tinctur. zingiber.	gtt. vi	0,4
	Tinctur. capsic.	gtt. iii	0,2
	Aquae	ad ʒss	15,0

M.

This can be given and the dose repeated in an hour if necessary. If these are not effective within two hours and the patient is of a furious type, a hypodermic of the following proportions will almost invariably quiet him:

℞	Strychnin. sulphat.	gr. 1/30	0,002
	Hyoscyamin. sulphat.	gr. 1/100	0,0006
	Apomorphin. hydrochlorid.	gr. 1/10	0,006

M.

If the patient has been very hard to put to sleep and needed all these hypnotics let him awaken naturally before beginning the specific. If he goes to sleep easily with the chloral and morphin it is safe to wake him every hour for the specific as he will quickly drop off to sleep.

Fourteen hours after the beginning of the specific, give 4 c.c. pills. One must judge here from the severity of the action of the 4 c.c. pills whether the same dose should be repeated or whether only 2 c.c. pills with gr. v of blue mass should be given.

At this stage the patient may need a further dose of the hypnotic and one may be able to carry the patient through the entire treatment without alcohol, but the older alcoholics and those in a weakened condition should have, with their milk, one or two ounces of whisky four times a day. This

whisky and milk is to be given only for the first forty-eight hours. During the second twenty-four hours only two doses should be given and after that it should not be given at all.

After the second dose of cathartic has acted—if the patient shows the characteristic green stool—he should be given an ounce of castor oil. From this there follows a watery green stool composed of mucus and bile.

If the patient cannot sleep for the next two or three nights he may be given trional (gr. v) at ten o'clock.

The Pettey Treatment.—Dr. George E. Pettey (of Memphis, Tenn.) also causes catharsis, and has the patient drink large amounts of water to dilute the body fluids, and to cause watery movements and a large amount of urine. He gives his patient tub and vapor baths. His cathartic combination is as follows:

℞ Calomel .....
Powdered extract of cascara sagrada, each 10 grains
Ipecac ..... 1 grain
Strychnin nitrate ..... ⅛ grain
Atropin sulphate .....1/50 grain
Mix, and make 4 capsules. Dose: 1 capsule.

His other medicinal treatment is scopolamin in 1/200-grain doses, spartein sulphate in 2-grain doses, and during the scopolamin treatment 20 grains of sodium thiosulphate every two hours for twenty-four hours or more.

After a patient has been freed from a desire for drug or alcohol, the former habits of life, habits of *thought* and, if possible, the environment must be changed to prevent a relapse. Physical exercises should be insisted upon and neurasthenic tendencies combated by firm management. The above treatment is best carried out in a hospital.

First Aid to the Injured

Bleeding—Fracture—Explosions

Brief General Management

It is very important not to attempt the exploration of wounds and reduction of open fractures at the place of accident. Many such attempts have resulted in infections and fatal shock. Except in a general way, no attempt should be made to find out the exact nature of the injury until the patient has been removed to a place where the lesion, as well as the surgeon's hands, may be disinfected.

Transportation.—The patient should always be covered. Never cover patients having open wounds with horse blankets, as tetanus may develop. If it is impossible to obtain a regular ambulance and stretcher, it will be necessary to provide some means for carrying the patient. Two men in step may grasp each other's wrists in such a way as to make a seat upon which the patient may sit while he steadies himself by placing an arm around the neck of each of his two bearers. If this is impossible on account of the severeness of the injury and no chair or board can be obtained, it will be necessary to improvise a stretcher.

Bleeding.—Hemorrhage must be controlled after injury as soon as possible in order to prevent shock. If the bleeding is from an extremity and no rubber tourniquet is at hand, elastic suspenders may be used. If no elastic bands are present a bandage or large handkerchief may be tied about the extremity just above the wound and twisted tightly by a thick thrust under the bandage, until the bleeding ceases. These tourniquets are extremely painful and should be removed as soon as the surgeon can aseptically ligate the bleeding vessel.

If the bleeding area is on the trunk or head, pack the wound with clean handkerchiefs and hold them tightly in place by means of a bandage.

In bleeding from the scalp it will be necessary to remove the clots from under the edges of the laceration before the bleeding vessels can be compressed against the skull. When this has been done a large compress or handkerchief should be placed over the wound and held in place by a bandage.

Fractures.—For temporarily immobilizing fractured limbs, canes, umbrellas, or boards may be used for splints. In the *upper extremity fractures* the arm may be immobilized by pinning the coat sleeve to the lapel of a tightly buttoned coat. Large handkerchiefs, strips of dresses, etc., may also be used for bandages to fix the arm to the side of the body.

In *fractures of the lower extremity,* if no material is at hand from which a splint can be made, the injured leg may be fastened to its fellow by bandages or by pinning the trouser legs or drawers together.

Clothing should not be removed from fractured limbs unless there is hemorrhage present. This necessitates thorough investigation of the source and severity of the bleeding.

Explosions.—These injuries are lacerations and burns. The eyes are often injured and shock, in different degrees of severity, is present. Small pebbles, bits of powder or earth are driven into the skin. They should always be removed from the face and eyes as soon as possible. The eyes should be bathed with a filtered saturated solution of boric acid, and the other areas on the face sponged with a two per cent solution of hydrogen peroxid.

Treat the shock and after a few days when the outer surface of the

skin begins to come away the individual functions may be investigated and the bits of earth and stone removed with forceps.

First Aid Outfit

The N. A. S. O. Standard First Aid Jar is procurable from the Secretary of the National Founders' Association (29 South La Salle Street, Chicago) for $5.50. The outfit is described in the N. F. A. Safety Bulletin, No. 18, while their Bulletin No. 17 gives concise instructions regarding "First Aid Treatment of Injured Persons" as formulated by the physicians in the several conferences representing industrial corporations which employ upward of six million persons in this country.

This Sanitary Jar is only 9½ inches in diameter, 6 inches high, and weighs slightly more than twelve pounds. It may be conveyed on rough trips in a padded shipping box of special construction. The compactness of this outfit may be judged from a survey of the contents of the jar:

1 Tourniquet
1 pair Nickel-plated Scissors
1 pair Nickel-plated Tweezers
1 Triangular Sling
1 Wire Gauze Splint
12 Assorted Safety Pins
1 2-oz. bottle Castor Oil
2 3-oz. tubes Burn Ointment or Carron Oil
1 2-oz. bottle 3 per cent Alcoholic Iodin
1 2-oz. bottle White Wine Vinegar
1 2-oz. bottle 4 per cent Aqueous Boric Acid
1 2-oz. bottle Aromatic Spirit of Ammonia
1 2-oz. bottle Jamaica Ginger (or substitute)
1 piece of Flannel 24 inches by 36 inches
1 roll Absorbent Cotton (1.5 oz.) or Compressed Cotton
1 roll 3 inch by 10 yds. Gauze Bandage
1 roll 2 inch by 10 yds. Gauze Bandage
2 rolls 1 inch by 10 yds. Gauze Bandage
1 spool 1 inch by 5 yds. Adhesive Plaster
6 packages 6 inches by 36 inches Sterile Gauze
1 Teaspoon
1 Metal Cup
1 Medicine Glass
2 Medicine Droppers
First Aid Record Cards.
3 Paper Drinking Cups

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